EXHIBIT “L”

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IN THE UNITED STATES DISTRICT COURT
FOR THE WESTERN DISTRICT OF NORTH CAROLINA
CHARLOTTE DIVISION
Case No. 3:18-cv-00197-RJC-DSC

BRUCE RHYNE and JANICE RHYNE,)

Plaintiffs,)

vs.)

UNITED STATES STEEL CORPORATION,)

et al.,)

Defendants.)

---)

DEPOSITION OF ROBERT F. HERRICK, Sc.D., CIH, FAIHA, called as a witness by and on behalf of the Defendants, Chevron U.S.A., Inc., CRC Industries, Inc., and Univar Solutions USA Inc., f/k/a Univar USA Inc., pursuant to the applicable provisions of the Federal Rules of Civil Procedure, before P. Jodi Ohnemus, RPR, RMR, CRR, CA-CSR #13192, NH-LSR #91, MA-CSR #123193, and Notary Public, within and for the Commonwealth of Massachusetts, at Veritext Legal Solutions, 101 Arch Street, Suite 650, Boston, Massachusetts, on Wednesday, November 6, 2019, commencing at 9:09 a.m.

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ROBERT F. HERRICK, Sc.D., CIH, FAIHA, having satisfactorily been identified by the production of a driver's license, and being first duly sworn by the Notary Public, was examined and testified as follows to interrogatories

BY MR. FISHKIN:

Q. Doctor Herrick, good morning.

My name is Andy Fishkin. I represent CRC in this case, along with Univar and Chevron.

How are you doing this morning?

A. Doing great. Thanks.

Q. Good. Doctor, how did you become involved in this matter?

A. I -- let's see...

I got a contact from -- from Andrew DuPont -- I'm trying to remember if it was an email or a phone call -- but he asked me if I was willing to be an expert in this case.

Q. And when was that, sir?

A. At least a year ago.

Q. Do you have a date?

A. You know, it's back there somewhere. I can -- would it have been -- probably last fall, maybe early -- early in 2019.

Q. Okay. What -- when you say that Mr. DuPont asked if you were willing to be an expert, did he ask you what he wanted you to do in the case?

A. Well, I had done some -- some cases with him previously, and the request was -- was similar; that this would be a case where he would like me to prepare a report with my assessment of Mr. Rhyne's exposures.

MS. CONDO: I don't mean to interrupt, but I don't know if others are having trouble -- I'm having trouble hearing the witness on the phone.

(Discussion off the record.)

Q. Were you asked to do anything else in the matter other than assess exposures?

A. No, that was really the -- the primary responsibility. The -- the whole assessment process, you know, I, kind of, view it as being in two steps: One step is compiling a detailed work history for the person, and, then, that's, kind of, the foundation for linking up the exposures with the particular work activities that he did.

Q. And did you prepare a detailed work history for Mr. Rhyne?

A. I did, and that's -- that's included --

that's basically the first half of the report.

Q. Okay. And did you do that personally?

A. Well, I did that, together with some other people I work with at the firm, EH&E.

Q. Okay.

A. Yeah.

Q. And how did the division of labor work?

A. Well, what we try to do is, they have some people who are very good at combing through the detailed work histories, and -- and so they do that and -- and I do it separately, and then basically merge the results of -- of our -- our findings.

So the -- the final version that's in the report reflects my assessment of the work history, but they do help in that process.

Q. Okay. Did you read Mr. Rhyne's deposition testimony --

A. I did.

Q. -- personally?

A. I did.

Q. Okay. Each day of it?

A. Yup.

Q. Okay. And obviously you prepared a report in the matter?

A. Yes.

Q. And did you prepare the report?
A. Yeah, I write the report, and then it goes in at -- at the firm, EH&E, to the final production, where they format it and -- and, you know, do the final editing and cosmetic changes.
Q. Okay. I'm going to put before you what we've marked as Herrick 1.
A. Okay.
Q. Doctor, is that your report in this matter?
(Exhibit Herrick 1, Expert Report of Robert F. Herrick, Sc.D., CIH, FAIHI.)
A. (Witness reviews document.) Yeah, this looks like my report.
Q. All right. Going through the report, does that help you to tell me when exactly you first became involved in the matter?
A. (Witness reviews document.) Well, let's see. So I signed -- the report's signed off as of September 17th, 2019. So I think I was probably involved, you know, for a period of -- of roughly six months, six or eight months.
So, I mean, I -- my recollection is that, you know, I really started getting information about this in early 2019.

Q. Okay. Does the report contain all of your opinions in this matter?
A. Yes, it does. Yeah.
Q. Did anyone else participate in the preparation of the report?
A. Well, aside from the -- the person, you know, the -- the staff I mentioned at EH&E, who contributed to, you know, helping me put together the work histories, but no one other than that.
Q. Okay. Obviously the report refers to some modeling you did; is that correct?
A. Right. Yes.
Q. Or modeling that was done.
Did you do the modeling yourself?
A. Yes, I did.
Q. So you sat in front of the computer and actually did the model?
A. I did, yes.
Q. Okay. And you picked all of the -- I mean, we're going to get into this later -- but obviously you relied -- at least in part -- on the ART model?
A. That's correct.
Q. Okay. And the ART model contains --
MR. DuPONT: Objection to form.

Q. And the ART model contains a number of modifying factors.
A. Yeah, there's -- there's a number of inputs.
I want to make sure I understand your question. You know, I do -- in the ART model, you know, the user doesn't enter the modifying factors, per se, but you have a series of inputs that you provide the program.
Q. Understood.
You have a series of choices that you can select from.
A. Sure.
Q. Okay. And did you make those choices?
A. I did.
Q. You made all of the selections?
A. I did.
Q. Okay. Thank you.
MR. DuPONT: Can I clarify something?
MR. FISHKIN: Sure. Yeah.
MR. DuPONT: Sure. Were there certain exposure assessments you did that were not through the ART model in this case?
THE WITNESS: Oh, there were, yeah.
A. Are we going to talk about them? 'Cause I

did some other modeling, but different procedure.
Q. Yeah. Understand.
Yeah -- no, I -- I think my question was -- I think you relied on the ART model in part. If I didn't say that, I meant to say that.
MR. DuPONT: That wasn't the question, which is why I wanted to clarify.
MR. FISHKIN: Okay. Yeah.
Q. No, I understand you didn't rely exclusively on the ART model. Okay. Understood.
So obviously you received information in the matter before preparation of the report; is that right?
A. I did, yeah.
Q. Okay. What information did you receive before preparing the report?
A. Well, there was a -- I think we used a -- a Dropbox or a share file -- I'm not sure what the technology was in this case -- but Mr. DuPont included information about -- well -- the depositions, obviously, from -- from Rhyne, and there was another deposition from one of his coworkers, whose name I'm blanking on right at the moment; and there were lots of documents in there about the safety data sheets and the product

information that he -- that Rhyne recalled using.
And let's see...
There were records from his radiation badge monitoring that he had worn.
Those are the main things that I'm bringing -- that I can bring to mind.
Q. So before the deposition started Mr. DuPont sent us a -- a Dropbox.
Have you seen that -- the material that's contained in that Dropbox that Mr. DuPont sent us?
A. I don't know that -- if it -- if it's the same information he sent me, then I have.
Q. Yeah.
A. I -- I have to, kind of, defer to, you know, him 'cause I didn't -- I don't recall.
Was this something he sent you very recently, or...
Q. Yes. And that -- and that's what I'm trying to find out whether the information that Mr. DuPont sent us in the Dropbox was everything that was in your file, or whether there were things beyond what was in your file.
And you haven't seen the Dropbox, so you can't tell me.
A. I guess I can't, no.

Q. Okay.
A. Yeah.
Q. All right.
MR. FISHKIN: Let's just go off the record for a moment.
(Discussion off the record.)
Q. Did you receive anything from Mr. DuPont's office or Mr. DuPont after you prepared this report?
A. Yeah, he sent me -- there were some other expert reports. I got the report from Spencer. I got the report from -- is her name Deeds? I'm, kind of, blanking on everybody's name exactly. Just a couple of days ago he sent me a deposition from Peter Infante, and, then, there were some other documents he sent me that were from physicians and, then, oncologists and people -- I'm not remembering all the names -- who were offering opinions in the case.
So, yeah, there were some things that -- that came in after I wrote the report.
Q. Okay. You understand that Mr. Spencer is one of the defense experts in the case?
A. Yeah, I do.
Q. Okay. Other than Mr. Spencer's report and

the Deeds report, did you receive any other defense expert reports?
A. Not that I recall. I don't think so.
Q. Did you receive --
A. Well, no. I'm sorry. These physicians -- I'm sorry. Let me amend.
Q. Sure.
A. These people who were commenting on the -- the genetic characteristics of Mr. Rhyne and all, I mean, those are all defense experts; right?
Q. Yeah, I don't -- I don't know who you're referring to, because I haven't been able to -- to look in the Dropbox --
A. Okay.
Q. -- but just -- do you remember the names?
A. Oh, well, there was one. It's -- it's coming. Oh, boy. Oh, Hoel, H-o-e-l.
Is that one of the experts, David Hoel? Yeah.
No, I'm sorry. There -- there were several people, you know, with degrees -- you know, physicians and, then -- backgrounds apparently in various aspects of genetics and so forth who offered opinions, but I'm not really getting -- I can't bring up their names right here.

Q. Do you recall receiving a report drafted or written by Pamela Williams?
A. Let's see. I -- I don't think I saw a Williams report in this one.
Oh, and also I should say, you know, there was an earlier report -- I might have done this -- that I got from a gentleman named Petty, P-e-t-t-y. I have that.
Q. Okay. And you got the Petty report before you prepared your report?
A. I did, yeah.
Q. Okay. Is it fair to say that the entirety of your -- well, withdraw that.
There are a couple of footnotes in your report which you have in front of you and specifically at Nos. -- at footnotes 241 and 245 that refer to "Documents Produced."
A. Let me take a look and see that. (Witness reviews document.) Oh, right. Uh-huh.
Q. Okay. What -- what is that referring to?
A. Well, in 241 this was information that we got -- that I got from Mr. DuPont about the chemicals that were on an approved list for the nuclear station, for McGuire. So, I mean, that's what that's referring to.

Q. What did you mean by "Documents Produced"? I assume that's your language. And I'm looking at the footnote.
A. Uh-huh. Well, that's -- you know, it was a document that was provided to me in the Dropbox.
Q. Okay. Do you know if it was produced in the matter?
Let me withdraw that.
Your -- your reference to "Documents Produced" is just simply to communicate that you received it.
A. Yeah.
Q. Okay.
A. Okay.
Q. You don't know whether it was produced in the matter, or, if it was, when it was. You don't know any of those details.
A. Oh, like, what the actual origin -- how it got to the Dropbox before I saw it?
Q. Sure. Yeah.
A. No, I don't.
Q. Okay. When did you receive that Approved Chemical List?
A. I was -- I was probably, maybe, midway through the process.

So say that I finished the report in September, I probably got it in -- in early fall.
Q. Did you speak to Mr. DuPont about the Approved Chemical List?
A. Oh, well, yeah, I did -- we did, yeah.
Q. Okay. Can you tell me about those conversations.
A. Well, typically what -- you know, the conversations usually involved email or a call back and forth between us when he had added something to the list, so -- or to the Dropbox, rather. So it was either an email from DuPont himself or from the paralegal at his firm, just alerting me that there was new information for me to look at.
Q. Are those emails -- are those emails contained in your file?
A. I actually don't know if all the emails are in the file or not.
Q. Okay. Did you talk to Mr. DuPont about the substance of the Approved Chemical List?
A. Yeah, because one of the things I was interested in was trying to drill down a little bit on a CRC product that Rhyne recalled using. And so, you know, when I got the Approved Chemical List, I -- you know, that was one of the things I

looked for, was to see if I could identify a particular CRC material that he used, and, in fact, there was one included in the list.
Q. When you say you tried to identify a -- you know, a product that he used, I'm not sure I'm following you.
What do you mean by that?
A. Well, you know, from his deposition he was able to identify the brand, but as -- as you know, of course, there's -- there's lots of different formulations of CRC products, and he didn't really have that level of recall as to, you know, what -- what the product number or what the particular name was.
So that's what I was trying to drill down to -- to find.
Q. And did this tell you what product he used?
A. Yeah.
Q. "This" being the Approved Chemical List.
A. Yeah, that's one segment --
Q. Let me just -- I've marked this as Exhibit 2. I'm sorry about that.
Is this the Approved Chemical List that we're talking about?

A. Let's see.
MR. FISHKIN: Do you want a copy of it?
MR. DuPONT: Let's see. Thanks.
Do we have a binder clip for his report or something just so it doesn't go flying --
THE WITNESS: I've got this.
A. Yeah, this -- I mean, I never printed it off. You know, I have it electronically, but this looks familiar.
(Exhibit Herrick 2, Approved Chemical List, PLF005295-339.)
Q. So that is the Approved Chemical List to which you are referring in your footnotes 241 and 245?
A. I believe it is, yeah. Yeah.
Q. Okay. How did that Approved Chemical List tell you that Mr. Rhyne used the CRC 3-36 product?
A. Well, I think I found it. I'm looking -- you know, I could look here again.
Q. It's at 305.
A. Oh.
Q. It's on there.
A. Okay. So I went down -- say again, I didn't have it in printed copy, but I, you know, looked through it on the computer, and found --

let's see -- "Cleaner, CRC 3-36, bulk CRC Chemicals." That's the trade name and manufacturer.
So that's -- that's how I found it.
Q. How did this entry on this list on this page tell you that he actually used that product?
A. Oh, I see.
Well, it's -- it doesn't really. But aside from the fact that, you know, as I look through this, I'm pretty sure I remember that this was the only CRC product that was identified, you know, in this -- in this list. So that's what I did to conclude that that's what he used.
Q. Sir, what is your rate of compensation in this matter?
A. I -- I think the company -- I think the billing out is at 450 an hour.
Q. All right. Are you billing out through EH&E?
A. I am, yeah.
Q. Okay. And what is your professional relationship with EH&E?
A. Well, I'm -- I'm a part-time employee. I'm a senior scientist --
Q. Okay.

A. -- is the title.
Q. And what are you paid by CR -- by EH&E?
A. Oh, what's my actual...
Gee, that's a good question, 'cause my wife, kind of, takes care of the -- the finances at home.
MR. DuPONT: Are you asking his -- in this case?
Q. Well, what's your -- I'm trying to understand your financial relationship with EH&E.
A. Uh-huh.
Q. So, for example, are you paid hourly by EH&E?
A. Yes.
Q. Okay. What are you paid hourly by EH&E?
A. I think by the time it all -- you know, because they -- you know, they basically treat me as an employee, you know, so they -- they take taxes and everything else out, so I think I'm seeing about 250 an hour. Something like that.
Q. Okay. Do you know if you were personally retained in the matter or if it was EH&E?
A. Well, the contact, you know, to -- the question about whether I would be involved, you know, came to me from Mr. DuPont, but in recent

years all the work I've done -- you know, any kind of work involving litigation I do through EH&E.
Q. Okay. And is your rate at EH&E 450 an hour for everything that you do in the matter, or are there different rates for different tasks?
A. No, it's a flat rate for everything.
Q. Okay. So that includes deposition testimony, that includes trial testimony?
A. That's correct, yeah.
Q. Who else at EH&E has worked on this matter?
A. Well, the person who helped when I was doing the work histories is -- is a woman named Bemnet Genesse, and she's an EH&E employee.
Q. Did anyone else from EH&E work on this matter?
A. No, I don't think they did on this case -- well, I'm sorry. Let me correct that.
Once I wrote the report, I sent it to EH&E in a Word -- as a Word final, and they have a production department that then, you know, makes the tables look good and -- and, you know, does the editorial work and -- and makes it into a PDF that's the final product.
Q. How many hours did you spend on the matter

prior to starting your report?
A. That's a good question.
You know, I easily could have spent maybe 30 or 40 hours, because, you know, I had some of the documents. I had Petty's report as a starting point. So, you know, I looked at that before I started writing my own report.
So, you know, that's probably a fair, you know, number -- in that range.
Q. What did you use Petty's report for?
A. Well, it was really [, of a -- of a background document. And, you know, I took a look at the way he had organized the information and the way he had described Rhyne's work history and -- and the way he had calculated his exposures.
So, you know, that was -- those were the main things I looked for.
Q. Did you notice that Doctor Petty or Mr. Petty did not calculate an exposure with a CRC product?
A. I think that does -- that does sound familiar, yeah.
Q. Okay. Do you recall why he didn't?
A. No, I really don't. Truthfully, I -- I had a little trouble following his report just in

terms of the way it was organized.
Q. How much time did you spend preparing your report?
A. Oh, wow. You know, I -- I know that would be in the billing records. I -- right off the top of my head I -- I wouldn't want to hazard a guess. I mean, it was -- it was a pretty extensive process.
Q. Your time in the matter is billed by EH&E?
A. It is, yeah.
Q. Okay. Have bills gone out?
A. Uh-huh -- yeah.
Q. And do they go to Mr. DuPont's office?
A. They do.
Q. Okay. Have you done anything in the matter since signing your report?
A. Well, I've mainly read, you know, the documents that have come in since my report that we talked about earlier. You know, I took a look at the experts' reports, and -- and, then, I've been reviewing information to prepare for today.
Q. How much time did you spend preparing for today?
A. It's -- it's been substantial. I -- I think I could have easily put in 15 or 20 hours.

Q. Did you meet with Mr. DuPont in preparation for today's deposition?
A. We did. We met yesterday.
Q. Okay. For how long did you meet with him?
A. It was about two hours.
Q. Do you recall any of the documents that you reviewed in preparation for today's deposition?
A. Well, my report, obviously; and I looked back at Rhyne's deposition; and I also looked at, you know, the experts' documents -- especially Spencer's and -- and Deeds -- that, you know, commented on -- on my report.
And, then, these three or four articles that I mention that I'd like to, you know, get into the discussion today, I looked over those again, just to make sure they were what -- you know, what I was really looking for.
Q. Have you ever talked to Mr. Rhyne?
A. No, I haven't.
Q. Have you ever asked to talk to Mr. Rhyne?
A. No, I haven't.
Q. Have you talked to Mr. Petty --
A. No.
Q. -- about anything?
A. No, I don't know Petty, actually.

Q. Okay. Okay.
Did you ever speak to anyone else in this case, other than perhaps coworkers at EH&E and Mr. DuPont?
Have you talked to anyone else?
A. No, I haven't.
Q. You -- you are not a medical doctor; is that right?
A. That's correct, yeah.
Q. You're not a toxicologist.
A. No, I'm not.
Q. You're not an epidemiologist.
A. I'm not.
Q. Your report does not contain an opinion on general medical causation.
A. It does not.
Q. Or specific medical causation.
A. Neither, no.
Q. And your report does not contain an opinion on warnings.
A. No, it doesn't.
MR. FISHKIN: I'll mark -- I have a -- I'm going to mark as Herrick 3 what purports to be your CV with a date of August of 2019.
(Exhibit Herrick 3, Robert F. Herrick

curriculum vitae.)
Q. I assume you've seen that before?
A. Yes, I have.
Q. Is -- is that the current version of your CV?
A. (Witness reviews document.) Well, I need to update it, actually, because there's a couple new publications that aren't reflected here. And also, I just did a review for EPA that I should mention on -- on this.
So -- but it's substantially current, yeah.
Q. Okay. Can you update it for us now on the record. Tell us what's missing.
A. There's a couple of articles -- I can't give you the -- you know, exact citation -- that have been published since -- since April. That's the last one I have on here.
And, then, the review I did for EPA was a review of a PCP document.
Q. All right. What was the subject of the couple of publications?
A. Oh, they -- they're papers that I'm a coauthor on with some of the -- some of my colleagues from Harvard, and it mainly had to do

with take-home exposures as a result of electronics recycling.
Q. Nothing at all to do with benzene?
A. No, these weren't benzene. It's metals and PCBs.
Q. Anything to do with the ART model?
A. No. There was no modeling in those, no.
Q. Other than the couple of publications and the EPA review, that is -- that CV is current?
A. Let's see. (Witness reviews document.) Yeah.
Q. On how many occasions have you been asked to testify or to serve as an expert witness in a litigation matter?
A. In -- in total over...
Q. Yes.
A. It's -- it's probably around -- I'd say between 10 and 12. It's getting up there.
Q. And what's the split between plaintiffs and defendants?
A. Oh, it's -- it's all been plaintiffs.
Q. Have you ever declined a request to serve as an expert witness in a litigation matter?
A. Well, I've had some conversations -- not recently, but years ago -- there were some requests

and things that I -- that I discussed about asbestos litigation, and I thought about doing it, and then decided that -- that I just wasn't going to.
Q. Why did you decide not to do it?
A. Well, some of it just had to do with my sense that I wasn't really as current as I would have wanted to be on asbestos, 'cause I hadn't worked in asbestos for quite a while; and it would have been a pretty steep learning curve, I felt, to really get to the point where I would have felt comfortable.
So -- and it was also -- I was -- it was when I first started at Harvard, and I was trying to, you know, get my research and teaching and, then, other things launched, so I just didn't feel like I should put the time to it.
Q. When did you first serve as an expert witness in litigation?
A. That would have probably been -- maybe almost 10 years ago.
Q. What kind of cases have you served as an expert in litigation?
In what kind of cases, I should say.
A. Oh, okay.

Well, there's -- some of them had to do with people who were -- I mean, the issue was adverse reproductive outcomes and -- and several of those involved people who worked in the semiconductor industry. So that was -- that was one set.
And, then, another set had to do with cases involving PCBs in building materials, where people were suing Monsanto -- or Bayer, I guess, as it's now called -- over remediation issues to -- to remove the PCBs from the buildings.
And, then, I've done two or three -- maybe this is the fourth -- of these cases involving benzene with Mr. DuPont.
Q. When did you start working with Mr. DuPont as an expert witness in litigation?
A. See, I'm going back. There -- I mean, I think it's been a couple of years -- two or -- I'll -- I'll estimate about two years.
Q. Have you worked with anyone else in benzene litigation other than Mr. DuPont?
A. No, I haven't.
Q. What's -- can you tell me the name of the cases that you have worked on with Mr. DuPont.
A. Well, the people who were involved, one

case is -- is Lesher, L-e-s-h-e-r; another is Coppage, C-o-p-p-a-g-e; another was Lee, L-e-e; and -- well, Rhyne, obviously; and, then, there was one for Howell, H-o-w-e-l-l.
Q. So it's five matters?
A. I think that's right, yeah. Yeah.
Q. Okay. Were -- were you asked to perform exposure assessments in those other matters that you worked -- that you were working on with Mr. DuPont -- or did work on with him?
A. Yeah. They all involved exposures; right.
Q. And you did modeling in each of them?
A. I'm trying to remember. I don't -- I -- I shouldn't be -- I can't say that with absolute certainty, 'cause I actually don't remember, you know, in some of the -- maybe one of the earlier cases.
What I try to do, you know, just in general is take a look at what's available in terms of published information on exposures. And so, as -- as you saw from -- from this report, I -- you know, I tried to use the best information I could find, and sometimes that includes historical measurements of exposure, and, then, other times it includes modeled exposures; and, like in the case

of -- of Rhyne here, it includes both.
Q. Is it always your preference to use historical measurements of exposures, as opposed to modeling?
MR. DuPONT: Form.
A. Well, I found over the years that, you know, it -- it's usually impossible to rely just on the historical measured exposures, and that's frequently because the information is just too sparse.
And also, frankly, over time I've come to the feeling that a lot of the methodology around the modeling of exposures has improved, and I've also, you know, tried to -- to stay current on the, you know, new developments in that area.
So, you know, I guess what I try to do is use the data as fully as possible and that would include both the measurements and the models.
Q. Have you testified at depositions in any matter in which you've served as an expert witness?
A. Have I done depositions --
Q. Yes.
A. -- prior to this one?
Yes, I have.
Q. Okay. What matters?

A. Well, I've done those semiconductor cases, those adverse reproductive outcome cases I mentioned; and I've done depositions in, I think, three of the PCB cases; and now this is the second deposition around the benzene cases.
Q. The first one being the Howell deposition?
A. Yeah. Right. Right.
Q. Okay. When were the PCB depositions?
A. They've been a couple of years. They -- they were probably in 2016 and '17.
Q. Do you recall the names of those cases?
A. Well, they were schools -- school districts that were suing Monsanto, and so one was Hartford, Connecticut; another was Westport, Massachusetts; and another was -- I'm blanking. It was the first one that I worked on. It's not -- it's back there somewhere, but I'm not recalling it, which -- which school it was.
Q. Do you recall the plaintiff's lawyer that you worked on those cases with?
A. The -- the firm in one case was Kennedy & Madonna, and the other two were Baron & Budd.
Q. Who at Baron & Budd did you work with, if you recall?
A. Is his name Brett? I think Brett Land, I

think.
Q. Do you have copies of the transcripts from those depositions?
A. You know, I don't -- you know, I doubt it. I mean, I probably didn't -- I don't think I -- I can't say for sure. In -- in the time that's elapsed between then and now, I moved, and I -- I offloaded a lot of -- a lot of paper that I just didn't want to transport. So I can't say for sure that I have them.
Q. Have you ever testified as an expert at a trial?
A. No, I haven't.
Q. Has a court ever declined to allow you to testify as an expert at trial?
A. No.
Q. Have you ever served as an expert in litigation on any subject other than industrial hygiene?
A. No, I haven't.
Q. Do you hold any current employment, other than with EH&E?
A. No, I mean, that -- you know, these advisory positions, you know, like the CPA advisory, that isn't, you know, really a -- it's

not, you know, not in the same category. That's just doing something, you know, as a consultant.
Q. Are you getting paid for that work?
A. On that EPA review I was, yeah. Yeah.
Q. But that's over?
A. It is finished.
Q. Okay.
A. It was a one-off, unless they decide they want to work it some more, but at least that initial project is done.
Q. Okay. In terms of paid work, it's exclusively through EH&E at this point?
A. That's correct, yeah.
Q. Okay. And is your work for EH&E exclusively serving as an expert witness in litigation?
A. It is at this point, yeah.
Q. You are fully retired from Harvard?
A. That's correct; I am.
Q. Not doing any teaching at all.
A. Not this semester, no.
Q. Are you -- do you have plans to go back?
A. Well, there's always -- you know, I mean, I'm still associated as an instructor, and so, depending on if they were to ask, I -- I would

consider doing some more, yeah.
Q. Is -- is anything in place now -- have you taken any steps to go back to Harvard and teach there?
A. No, I haven't.
Q. Is it your hope or expectation to become involved as an expert witness in additional benzene cases?
MR. DuPONT: Form.
A. Well, that's a good question.
I -- you know, it depends, I guess, a little bit on the nature of the workload, because the other activities I've been doing around the semiconductor cases are, kind of, picking up steam and heating up; and so what I try to do is balance out so that I don't have too many things going on simultaneously.
So I guess that -- that's, kind of, a long answer to say I actually don't know.
Q. You've never worked as an expert in litigation for a defendant, I think you said earlier; is that correct?
A. That's right, yeah.
Q. Okay. And no defendant's ever asked you to serve as an expert in litigation.

A. No, I did -- a long time ago I did a report for a defendant, but that -- that was -- you know, that was where it ended. I just wrote the report, and that was the end.
Q. And what kind of case was that?
A. It was asbestos.
Q. And when was that?
A. That was early in the going. That was probably back in the mid-90s.
Q. All right. I want to ask you about some of your opinions in the matter. You've got your report there.
A. Yeah.
Q. Okay. I want to start with Table 3, which I think is actually on page 39.
A. Okay.
Q. As I understand, Table 3 is the "Daily Average Benzene Exposure to Certain Products By Product Name and Facility"; is that right?
A. Let me just get to it here. (Witness reviews document.)
Right. That's what -- that's what we're looking at here, yes.
Q. All right. Table 4, which is on page 43, is the cumulative benzene exposure to each of those

products by product name and facility; is that right?
A. That's correct. Yes.
Q. Who selected the products that are listed in Tables 3 and 4?
A. This is my assessment of what he reported in his depositions that he used.
Q. You performed an exposure -- as I understand it, you performed an exposure assessment for each of the products listed in Tables 3 and 4, other than Tap Magic/Rapid Tap and Spotcheck; is that correct?
MR. DuPONT: Form.
A. Well -- and also the Marvel Mystery Oil, I didn't do a calculation of commuted exposure for that either.
Q. Okay.
A. But, yes. Yes, to your one question.
Q. Did you perform an assessment to determine Mr. Rhyne's exposure to benzene from any products beyond the products that are listed in Tables 3 and 4 for which you actually did perform this exposure assessment?
A. No, I didn't.
MR. DuPONT: Form.

Q. Why didn't you perform an exposure assessment to assess Mr. Rhyne's exposure to benzene beyond the products -- or from products beyond those listed in Tables 3 and 4?
A. Well, these were the products that he reported having used at home and -- as he -- as he was growing up and as he was a student and, then, during his employment. So that was really all I had to go on in terms of his, you know, history of product use.
Q. All right. Just one followup on that answer: You said that these are the products that he identified using. Do you agree with me that he did not identify having used the CRC 3-36 product?
MR. DuPONT: Form.
A. I -- I'd have to look in his deposition.
My -- my recollection was that he reported using CRC when he was cleaning parts.
What I don't remember is that he was able to identify a particular brand or trade name or...
Q. Do you recall that he testified that he could not identify the specific CRC product that he used?
A. Well, I wouldn't rule that out. I'd have to, you know, look to -- look in his deposition to,

you know, be absolutely sure, but, you know, I think that's certainly possible, yeah.
Q. But sitting here now you don't recall if that's accurate.
A. I just don't remember one way or the other. I mean, I do remember that he, you know, was able to recall CRC, but I don't remember that he knew the particular product.
Q. Okay. I'm going to -- I have his testimony here.
A. Okay.
Q. I'm going to put before you his testimony at page 445, and it's got some of my handwritten notes -- or it's just got a couple of arrows --
A. Okay.
Q. -- which you could ignore or do what you want with.
If you could just read page 445.
A. (Witness reviews document.) Okay. So the question has to do -- "For the end bells that you did not take to the parts washer, did you use products to clean them other than the CRC product?" And he said, "I don't recall any. Question: What was the name of the CRC product that you used? Answer: CRC is all I can remember."

Q. And then he testifies to that again. The questioner asked him the same question again.
A. Question was "What was the name of the CRC product?" And his answer was "CRC is the only one I --" and then the question: "Anything beyond that?" And he said, "No, sir."
Q. Okay. So does that refresh your recollection that he testified that he could not identify the CRC product that he used?
MR. DuPONT: Objection. Form.
A. I -- this is, yeah. I think this is pretty, you know, that -- that was the best recollection he had. He remembered CRC, but he wasn't able to identify a particular brand or product name.
Q. All right. I'll take that back. Thank you.
Do you recall anything in the record in this matter that -- withdraw that.
Did you see any information that Mr. Rhyne ever worked with or around a Berryman product?
A. I -- I don't remember that coming up at all. I don't recall that he mentioned that he had ever used Berryman, no.
Q. Did you see any information in the record

that Mr. Rhyne ever worked with or around a 3M product?
A. That does not ring a bell. I don't remember that he mentioned that, no.
Q. Doctor, did you have any information about the different manufacturers and suppliers of solvent ingredients that may have been contained in the different products that you listed in Tables 3 and 4?
MR. DuPONT: Compound.
A. Could you help me understand the "solvent ingredients."
Q. Sure.
A. That would be, say, the manufacturer of the components that were in these -- these end user products?
Q. Yes.
Manufacturers or suppliers.
A. Uh-huh.
MR. DuPONT: Compound.
A. I don't remember -- I don't believe that I had that information, no.
Q. Do you understand -- obviously -- well, let me take that back.
Do you understand that each of the

products that are listed in your Tables 3 and 4 contain various components or ingredients?
MR. DuPONT: Compound.
A. I do understand that, yeah.
Q. Okay. Do you know anything about the parties -- party or parties that supplied those solvents or ingredients or manufactured those solvents or ingredients in those products?
MR. DuPONT: Compound.
A. Well, in some cases, you know, there was information -- for example, on the Liquid Wrench, you know, there was information about the raffinate material that was, you know, an ingredient in Liquid Wrench. So I do know something about that.
Kutzit, there was information about the benzene content and about the -- the change in the formulations and all, but I -- I don't remember the details about, you know, who was really supplying the ingredients.
Q. I'm going to see if I can narrow my question a little bit.
A. Okay.
Q. There's a product on there, Safety-Kleen parts washing -- or washer.
Do you see that?

A. I do. Yeah.
Q. You understand the Safety-Kleen parts washer contains mineral spirits?
A. I do.
Q. Do you know who supplied or manufactured mineral spirits that were contained in Safety-Kleen parts washing solvent that Mr. Rhyne worked with?
A. I don't remember that from -- from the record, no.
Q. Do you understand that CRC 3-36 was comprised of different components?
A. I do, yeah.
Q. Do you know who manufactured or supplied any of the components contained in the CRC 3-36, which you seem to believe Mr. Rhyne worked with?
A. No, I had information -- I think it was a 2008 safety data sheet from CRC. So that's how I identified what I think the ingredients were, but I don't know what the source was.
Q. You don't know -- you don't know what the source was for the ingredients.
A. I don't, no.
Q. So I want to talk a little bit more about Rapid Tap/Tap Magic.
A. Okay.

Q. And that is a product that you did not perform an exposure assessment for; is that correct?
MR. DuPONT: Form.
A. That's correct.
Q. If you go to page 30 of your report.
Do you see that there's -- oh, I'm sorry.
A. Got it.
Q. You see that there's a paragraph entitled "Rapid Tap -- Tap Magic"?
A. Yes.
Q. Okay. And in the first sentence of that paragraph you refer to the "Approved Chemical List"; is that right?
A. Right.
Q. And you refer to the fact that the Pro Tap Magic Cutting Fluid Red is contained on that Approved Chemical List; is that right?
A. It is, yeah.
Q. Now, as I understand it, in the rest of the paragraph you are communicating that you did not estimate his benzene exposure from that source, because the record evidence in the case didn't indicate which specific Tap Magic product Mr. Rhyne used.

Do I have that right?
A. You do, yeah.
Q. There's a discussion about Spotcheck in the next paragraph there.
Do you see that?
A. I do.
Q. Spotcheck is another product that was on the Approved Chemical List; is that right?
A. Right.
Q. But you also did not estimate his exposure to benzene from that product; is that right?
MR. DuPONT: Form.
A. That's correct, yeah.
Q. And you didn't assess his exposure to benzene from that product, because in your view the record in the case did not indicate the composition of the product as used by Mr. Rhyne.
A. That's true, yeah.
Q. Did you do anything to search for MSDSs for Spotcheck?
A. I'm trying to remember if I did. I think I probably did.
The one thing, you know, I found in -- in searching the internet is that, you know, occasional -- you know, sometimes you can get a

current MSDS, but in a case like -- like this, going back to the 1980s, you know, it's very rare to -- to find that kind of historical information on just an internet search.
Q. Why doesn't a current MSDS satisfy your needs?
A. Well, I think --
MR. DuPONT: Form.
A. -- you know, it reflects the -- the change in -- in people's approach to formulating products; that, you know, it's not surprising that something that, you know, reflects the current composition is not a good representation of what was used 30 years ago.
Q. Did you ask Mr. DuPont if he had an MSDS for Spotcheck from the relevant time?
A. I think I did, because as we, you know, exchanged information back and forth, you know, where there were gaps and, you know, missing information or -- or documents that I could have used, I -- I followed up and asked, yeah.
Q. Do you have a specific recollection of asking him that?
A. I don't.
Q. Do you understand that Spotcheck is

manufactured by Magnuflux Corporation?
MR. DuPONT: Form.
A. No, I don't -- oh, well, sure -- sure I do, 'cause here it is. It's -- I mean, it does mention Magnuflux in the Approved Chemical List.
So yeah, I do see that.
Q. Do you understand that Magnaflux Corporation is not a named defendant in the case?
A. Oh, no, I guess they're not.
Q. Did Mr. Rhyne have benzene exposures from daily living every day of his life before he was diagnosed with AML -- separate and apart from any exposures that he had to benzene from the products that you talk about in Tables 3 and 4?
MR. DuPONT: Form.
A. Okay. So you're referring to, say, nonoccupational exposures?
Q. Well, I think your report talks about nonoccupational exposure to certain products.
So I'm talking about did he have -- or I'm asking about whether he had benzene exposures from daily living, separate and apart from any benzene to which he was exposed from the products on Tables 3 and 4?
MR. DuPONT: Form.

A. Yeah, I mean, he probably had the same kind of exposures that, you know, most of us have. There's benzene levels in ambient air -- varied, you know, quite a lot, depending on where you live.
He -- I don't remember if this came up, but he very likely pumped his own gas at the gas station and filled his car. So, you know, he had that source.
He wasn't a smoker, so, you know, I think that's -- that's, you know, sort of, off the table. That's always, you know, something to consider.
And I don't know that he, you know, I don't remember from the record if he lived with anyone who smoked. I just don't remember that part.
Q. Did you in your report estimate his daily exposure to benzene, separate and apart from what you believe he was exposed to from the products in this case?
A. No, I didn't.
Q. Did you in your report calculate his cumulative exposure to benzene from daily living in the nearly 60 years before he was diagnosed with AML, separate and apart from benzene to which he was exposed to the products that you list in Tables

3 and 4?
A. No, I didn't.
Q. Why didn't you do any calculations to assess his exposure to benzene -- either on a daily basis or a cumulative basis -- from daily living?
A. Well, I think it was -- it was partly as I was trying to be responsive to the -- you know, the question that was put to me, you know, in -- in engaging me as an expert here, was around his occupational exposure.
So that's why I restricted it to that.
Q. You understand that before you were retained in this matter as an expert on behalf of the plaintiffs that the plaintiffs had retained Stephen Petty?
A. Right, I do.
Q. Okay. You understand that he served in the same role that you're now serving?
A. I do, yeah.
Q. How did you learn that the plaintiffs had previously retained Mr. Petty?
A. Well, that's when -- when Mr. DuPont sent me a copy of Petty's report.
Q. Were you told why Mr. Petty was no longer serving as an expert for the plaintiffs in this

matter?
A. No.
Q. Did you ever ask?
A. No.
Q. Do you know why he's no longer serving?
A. I don't.
Q. Do you know if it has anything to do with the fact that he did not assess any benzene exposure from a CRC product?
A. As I said, I don't know why he isn't involved at this point.
THE WITNESS: Are we getting close to a break?
We've been going about an hour.
MR. FISHKIN: Take a break whenever you need it.
THE WITNESS: Is that reasonable?
MR. FISHKIN: Sure. Yeah.
(Recess was taken.)
Q. Doctor, are you ready?
A. Okay.
Q. Okay.
MR. FISHKIN: Andrew, are you ready?
MR. DuPONT: Just a second.
Yeah, go ahead.

Q. Doctor, did you see anything in the record in this matter that told you that Mr. Rhyne did, in fact, actually work with or around CRC 3-36?
A. Other than what we just looked at in the deposition when he recalled using a CRC product, but he didn't recall the -- the particular brand or -- or product name.
Q. Right. And that's what I'm getting at. I -- there was testimony -- without question -- in which Mr. Rhyne said he used a CRC product, but I'm focused on what product it was.
So -- so my question is did you see anything in the record in this matter that told you that Mr. Rhyne did, in fact, work with or around the CRC 3-36 product?
A. Other than what was on the approved product list for McGuire, that was the only thing that really identified a particular CRC product.
Q. Did anyone ask you to run an exposure assessment for the CRC 3-36 product?
A. Specifically --
Q. Yes.
A. -- beyond -- no, not beyond, you know, the general request that I do the exposure assessment for -- for Rhyne. There was no particular, you

know, CRC call-out or anything that I -- that I, you know, looked at that uniquely.
Q. When you received the -- do you recall the circumstances under which you received the Approved Chemical List?
A. I -- I'd have to say I think it was probably the same way I got everything else: Either Mr. DuPont or his paralegal sent me a note and said, you know, we've -- we've updated the Dropbox, so there's new information in the Dropbox; here's the link.
Q. What was -- do you recall receiving that as a stand-alone document?
A. The notification that that particular list was now in the box?
Q. Yes, sir.
A. I -- I don't think so. I mean, it tended to be more, you know, there were -- there were -- information was, sort of, coming in -- in batches. And so I don't think it was a, you know, unique communication to say, Hey, look at the box; there's an Approved Chemical List there.
Q. Was it called out to you when you received the list that there was a CRC product on the list?
A. No, I -- I found it myself.

Q. Do you know anything about the chemical list, other than what's contained in the chemical list?
A. I'm trying to remember if anybody asked him about it. I don't remember there being any discussion about the list from the depositions. So beyond what's, you know, evident from looking at the list, I really don't have any information beyond that.
Q. Do you know if the list is authentic?
A. I don't have any reason to -- to doubt that it is. It sure looks authentic to me.
Q. But do you know, one way or another --
A. I don't, no.
Q. -- whether it is.
Do you know whether it's a document that was actually prepared by Duke Energy?
A. I guess I don't have it in front of me, do I?
Q. Yeah, you should have in that stack. We marked it as 2.
A. Oh, sorry. Here it is.
Q. Is that 2, did we mark it as?
A. Yeah, it's 2.
MR. DuPONT: It is.

A. Well, you know, the header on each page does say: "McGuire Nuclear Station Approved Chemical List," page number and a date. So, you know, I -- I would infer that, you know, that -- that leads me to believe that it is authentic.
Q. Well, do you know if it was actually a document that was prepared by Duke Energy?
A. Well, no one -- there's no -- in the version that I saw there was no, you know, cover letter or transmittal, or, you know, sign-off of any kind. So I don't have any information beyond what's here.
Q. If it was prepared by Duke Energy, do you have any information concerning the circumstances surrounding its preparation?
A. I don't remember that anybody -- you know, that it really came up in any of the depositions as to, you know, kind of, the circumstances or -- or how it was prepared or why.
Q. Do you know when it was prepared?
A. Well, it is dated April 1st, 1992.
Q. Understand.
Do you know when it was prepared?
A. I don't, no.
Q. Now, do you understand that this applies

to chemicals approved for use at McGuire at a particular time on April 1, 1992?
MR. DuPONT: Form.
A. I think that would be a reasonable conclusion to reach, yeah.
Q. So this list doesn't tell you what the approved chemicals were for any other Duke Energy location; is that correct?
A. No, it doesn't.
Q. And it doesn't say that any of the chemicals approved for McGuire -- withdraw that.
It doesn't say that any of these chemicals listed as approved for McGuire were approved for use at McGuire before April 1, '92 is that correct?
A. No, it looks like it's a -- you know, it reflects a point in time, but, you know, you'd have to speculate beyond that.
Q. Do you know for how long after April 1, 1992, these products were approved for use at McGuire?
A. No, I don't.
Q. So you can't say they were still approved for use at McGuire in May of 1992; for example?
A. No, I can't.
Q. Now, this list is -- I would represent to

you is 46 pages long, and it contains -- from my quick review -- about 20 different chemicals on each page, which gets us to about 900 chemicals.
Do you see that?
A. I think that looks like a reasonable estimate, yeah.
Q. Do you know how many of these 900-or-so chemicals were actually at McGuire on April 1, 1992?
A. I don't.
Q. Can you identify the ones that were actually at McGuire on April 1, 1992?
A. No, I can't.
MR. DuPONT: Form. Compound.
Q. Can you identify the chemicals on this list that were not actually at McGuire on April 1, 1992?
A. There's -- there's really no -- I don't have any information that would let me do that.
Q. Do you know whether there were products at McGuire at this time that were not on the approved -- on this Approved Chemical List?
A. I -- I don't know that.
Q. Now, on the top right of this document there's a reference to "Storage Color, Label, and

Commodity ID."
Do you see that?
A. Yeah, I do.
Q. And do you understand -- and to the far right column there are references -- or there are indications -- there are "Ns" and there are "Ys."
Do you see that?
A. I do see that, yeah.
Q. Do you understand the "Y" refers to the fact that there was a label?
MR. DuPONT: Form.
Q. And that the "N" refers to the fact that there was not a label.
MR. DuPONT: Form.
A. You know, that would be a reasonable conclusion to draw from the header on that column; that's what -- that's what that is designating, yeah.
Q. Do you know what "Storage Color" refers to?
A. I don't. I mean, I could guess, but that would just -- you know, I don't really know their system. So no, I don't.
Q. Do you know what "commodity ID" refers to?
A. Well, I guess that, you know, I would

interpret that to be, you know, essentially an inventory number of some kind that the company was using to keep track of this.
Q. Do you know that?
A. I -- it didn't really come up anywhere in -- in the record that would -- I'm just trying to draw what I think would be a logical conclusion.
Q. Top left refers to "Category and Fact Sheet Number."
Do you see that?
A. I do.
Q. Do you know what they refer to?
A. Well, the categories are pretty big and broad. So, you know, you see it's stuff like abrasives and chemical additives and coatings, and I think they have sealants and lab -- lab chemicals and things like that. So, I mean, I think that that's pretty self-explanatory.
Q. What about "Fact Sheet Number"?
A. That, I don't really -- you know, it must refer to some internal system that they had where there was further information in a database or something, but I don't remember that being discussed anywhere in the documents I reviewed.
Q. Do you know how Duke characterized its

products in 1992?
MR. DuPONT: Form.
A. No, I don't.
Q. Do you know whether there are any mistakes on this Approved Chemical List?
A. No, I don't.
Q. Do you understand the reference to "CRC 3-36 includes the word "bulk"?
And, again, it's on page 305.
A. (Witness reviews document.) Oh, I see. Yeah. "CRC 3-36 bulk, CRC Chemicals."
Q. Does that suggest to you that what purports to be approved here is the product in bulk, such as in drums or some other container used for bulk shipment?
A. Well, I wouldn't rule it out. It's -- it's interesting. You know, it's -- it's not uniform; right? If you look at all these other cleaners on the page, for example, they don't specify if something is bulk or not.
Q. Well, they don't -- the other cleaners on the page don't contain the word "bulk"; correct?
A. That's -- that's what I'm saying; right.
Q. And the CRC 3-36 says, "bulk." So my question is do you understand that to mean that

what purports to be approved here is the CRC 3-36 product in bulk?
A. Well, I think that would be a reasonable, you know, conclusion to reach, you know, not -- not really knowing Duke's system, but I certainly wouldn't rule that out.
Q. Did you see any information in the record that Duke had a canning operation where it placed bulk liquids into aerosolized cans?
A. You know, I don't remember that coming up. I don't remember seeing that.
Q. Did Mr. Rhyne ever work at McGuire?
A. Did he work at McGuire?
Q. Yes.
A. Yes.
Q. When did he work at McGuire?
A. I don't know. I'd have to look at the report. I can -- I can try to dig that out. I think I have it.
Sounds like -- 1976 to 1983. I think that's his time at McGuire.
Q. Where did -- where did Mr. Rhyne work in April of 1992?
A. (Witness reviews document.) I'm just looking through his work history here.

Q. Have you look at page 10 of your report --
A. Uh-huh.
Q. -- you refer to the fact that he transferred to Catawba in 1983 and worked there until 2015.
Do you see that?
A. Uh-huh. Yeah, I do see that. Yes. Right.
Q. So let me just ask you the question again: Where did Mr. Rhyne work in April of 1992?
A. Well, so, as he mentioned in his deposition, from 1983 to January of 2015 he was based at Catawba.
Q. So if you interpret Exhibit 2 as an Approved Chemical List which indicates that CRC 3-36 bulk was at McGuire in April of 1992 and Mr. Rhyne did not work at McGuire in April of 1992, how does this Approved Chemical List lead you to believe that he worked with or around CRC 3-36?
MR. DuPONT: Form.
A. Well, it's really, as I -- as I tried to discuss it on page 11, you know, from his deposition, he said that he used CRC from 1985 to the '90s, and up to maybe 2000, and it was originally in aerosol, but they switched to a pump

sprayer.
That's, you know, the extent of the information that I have.
Q. Yeah. No, I understand that.
But I'm just trying to understand your rationale in relying on this Approved Chemical List which shows -- or purports to show that the product is approved for use at McGuire at a time when he's not at McGuire. I'm trying to understand your rationale in taking this approved list to mean that he worked with or around 3-36.
MR. DuPONT: Form.
A. When he was at Catawba?
Q. Yeah.
A. Right. No, I mean, I follow your point. I guess I would just say that, you know, I wouldn't find it to be unreasonable that the same products were used across different facilities.
Q. Do you have any information that the same products were used across different facilities at Duke?
A. Well, as he said, you know, in his deposition, that, you know, he used CRC at a time when he was actually at Catawba, so that that's about the only information that's in the record

that would shed any light on that.
Q. Do you have any information from the record that the same products were used across different locations at Duke?
A. You know, I don't remember that coming up. I -- I wouldn't consider it to be unreasonable, but it isn't really explicit in the record.
Q. Is it implicit in the record?
A. Well, you know, knowing a little bit about, kind of, you know, how big companies like Duke operated, I would say it's not unreasonable to think that the same products were used across facilities.
Q. How do you know how Duke operated?
A. Well, I -- I know a bit about how major corporations tend to function and how they tend to procure supplies and how they're -- especially when they're, you know, operating similar facilities. So I guess I would just say I wouldn't be surprised if the same products weren't used throughout the corporation.
Q. Okay. But you have no knowledge that they were, in fact, at Duke Energy; is that correct?
A. I don't have anything explicit. You know, it didn't really come up in anything in the record.

Q. Can you rule out that Mr. Rhyne worked with a CRC product other than CRC 3-36?
A. No, because there -- there's only that one snapshot of the approved chemicals from 1992.
Q. Can you rule out that, if Mr. Rhyne worked with a CRC product, it was a CRC product that did not contain benzene or benzene-containing solvents?
A. Oh, I see. Okay.
No, it didn't really -- you know, I didn't really see anything in the record that would shed any light on that.
Q. You understand from reviewing Mr. Rhyne's testimony that he claims to have used the CRC product to clean parts such as nuts, bolts, washers, end bell flanges, tools, and heat exchange components?
And, in fairness, I'm reading from 12 and 13 of your report.
A. (Witness reviews document.) Right. I remember that. And that really is pretty much straight from his deposition.
So yes.
Q. All right. Do you see any information in the record that employees at Duke cleaned equipment with lubricants or corrosion inhibitors?

MR. DuPONT: Form.
A. That they cleaned equipment with lubricants and...
Q. Yes.
A. I don't remember seeing that level of information, yeah, that he was asked about that or that anybody really commented on that.
Q. Would it be unusual in your experience for a mechanic to clean equipment with a lubricant?
MR. DuPONT: Compound.
A. I don't know if I would say, "unusual." I mean, there's clearly some products that have a variety of -- of properties that, you know, could include both cleaning and lubrication.
I don't remember that, you know, really being discussed in anything that he talked about, though.
Q. Did you see any testimony from Mr. Rhyne about the color of the label of the CRC aerosol product he claims he used?
A. I remember him talking about, you know, the aerosol can, and, then, at some point in time it was changed over to something that was in a -- a pump, you know, where you pumped it to generate the -- the spray. But just sitting here right now,

I'm not getting a real clear recollection that he remembered -- or maybe if he even was asked about the color.
Q. If -- if I asked you to assume that he testified that the CRC product had an orange label -- I'm asking to you assume that --
A. Uhm.
Q. -- would that affect your belief that the CRC product that he used was the CRC 3-36?
MR. DuPONT: Form.
A. You know, I don't remember the CRC product line that well to know if that is a distinguishing characteristic of the 3 -- 3-36.
Q. Have you ever seen an approved -- I think you -- I'm not sure that you answered this question; you may have; I apologize if you did: Have you ever seen an approved chemical list for the Catawba nuclear station during the time period when Mr. Rhyne worked there?
A. No, I only have the list from McGuire.
Q. "List" being Herrick 2?
A. Right. The exhibit you're talking about, yes.
Q. All right. You opine in your report that Mr. Rhyne had a total mean cumulative benzene

exposure ranging from 8.86 ppm-years to 34.44 ppm-years, with a midpoint estimate of 19.77 ppm-years; is that correct?
That's on page 44.
A. Uh-huh. (Witness reviews document.) Right. That's what I said.
Q. Okay. That -- those numbers are markedly lower than the numbers that Mr. Petty came up with; is that correct?
A. Yeah, they are. They are. Uh-huh.
Q. Did you review how Mr. Petty came up with those numbers?
A. Well, I did review his report. You know, I -- as I said earlier, I had a little problem, you know, fully understanding the methodology. So, I mean, I -- I -- in a general sense I think I understand how he came to his -- to his answers, but I don't recall, you know, the real details.
Q. Did you think there was any basis for his exposure numbers?
MR. DuPONT: Form.
A. Well, I think he described his -- his basis. What I couldn't quite follow was exactly how he implemented his methods, but I -- I thought his explanation, you know, was -- was pretty

substantial.
Q. Did you think his numbers were wrong?
MR. DuPONT: Form.
A. Not really. I mean, you know, in these, you know, kind of, you know, reconstructions -- which I've done, you know, and, kind of, made that --
(Environmental noise.)
(Discussion off the record.)
A. I mean, as you probably saw from my CV, I mean, this kind of exposure reconstruction is a pretty big part of what I've done over my years in research, and so I'm not, you know, really surprised to see, you know, somewhat discrepant results between different investigators employing different methods.
MR. FISHKIN: Okay. Let's go off the record.
(Discussion off the record.)
Q. Now, the -- the cumulative benzene exposure numbers or ranges and midpoint estimate that you came to was without dermal exposure; is that correct?
A. That's correct, yeah.
Q. You didn't calculate any dermal exposures

that Mr. Rhyne had?
A. No, I didn't.
Q. And you don't offer any opinion in your report about dermal exposures specific to CRC; is that correct?
MR. DuPONT: Form.
A. Well, my -- you know, I did try to address dermal exposures, but I didn't do it on a product-specific basis, no.
Q. Now, based on your assumption that Mr. Rhyne used CRC 3-36, you offer the opinion that Mr. Rhyne's benzene exposure from that product was between approximately 1/4 of 1 percent and 2 1/2 percent of the total exposure to benzene he had working with the products for which you performed exposure assessments; is that correct?
A. Yeah, I think that's right. I'm just -- and as you saw, it depends a little bit on what assumption you make about the benzene content, 'cause I did it for 10 parts per million and also for 100 parts per million.
Q. Right. You just said it depends a little bit on that. I understood it depended exclusively on that.
A. Well, I suppose that's a better way to put

it, yeah.
Q. All right. Am I correct that the CRC 3-36 contribution would have been even lower -- had you included it in your cumulative exposure number -- the benzene to which he would have been exposed from working with products for which you did not calculate benzene exposures?
MR. DuPONT: Objection. Form. Foundation.
A. Well, I -- I tried, you know, not knowing what other products that could possibly be -- are you referring to things in the workplace or --
Q. Yes.
A. -- stuff at home or --
Q. I'm referring to Rapid Tap/Tap Magic and Spotcheck.
A. Oh, I see.
MR. DuPONT: Form.
A. Okay. Yeah, if -- if those had been, you know, substantial contributors to the overall benzene, then the share that was allocated to CRC would have been lower.
Q. Well, if they had been contributors to any extent, the share attributed to CRC would have been lower.

MR. DuPONT: Form.
A. Yeah. Yeah, the total would have been larger, and the CRC share would have been smaller.
Q. And CRC's share would have been still smaller if you had included in your benzene exposures his exposure to benzene from daily living over the 58 years before his diagnosis; is that correct?
MR. DuPONT: Objection to form.
A. Yeah, although I must say, you know, not having any reason to think that his benzene exposures, you know, from his life outside the workplace were in any way remarkable, you know -- he didn't live near a refinery or something like that -- I think the contribution from those sources would have been small.
Q. When did CRC begin selling its 3-36 product in aerosol cans?
A. You know, I don't know the answer to that.
Q. Do you have any information on the composition of the product in the 1990s?
A. I think I do. I mean, you know, I can't pull one up to mind right now, but, I mean, I do have a pretty good set of safety data sheets for the range of CRC products.

Q. So I -- my understanding -- and I may be wrong -- but my understanding was that the MSDS that you had for CRC 3-36 was from 2008.
A. Oh, that -- I'm sorry. I may have misunderstood your question.
Were you referring just to that one particular product --
Q. Yes.
A. -- for CRC?
Q. Yes.
A. Oh. Yeah, the only information I really had for that particular CRC product is that safety data sheet from 2008; right.
MR. FISHKIN: Okay. And let's just mark it for the record for completeness sake.
Q. So, Doctor, I've marked as Herrick 4 an MSDS.
A. Okay.
Q. Is that the MSDS for 3-36 that you had in your file?
(Exhibit Herrick 4, Material Safety Data Sheet.)
A. Looks like it, yes.
Q. And that's the only MSDS that you have seen for 3-36?

A. I believe it is, yes.
Q. And, by the way, do you see in this MSDS any indication that this product has cleaning capabilities?
MR. DuPONT: Form.
A. Well, it's identified as "Multi-Purpose Lubricant and Corrosion Inhibitor." That's -- you know, and I don't remember there being any, you know, particular information about, you know, sort of, the intended uses or applications beyond what's in the product name.
Q. You understand that the primary ingredient in this product -- in 2008, at least -- is a petroleum distillate CAS No. 64742-47-8?
A. I do see that, yeah.
Q. Do you understand that's a hydrotreated mixture?
A. I do, yes.
Q. Do you understand that it consists of hydrocarbons having carbon numbers predominantly in the range of C-9 through C-16?
A. Correct. That's my recollection, yeah.
Q. You understand it has boiling points in the range of 150 to 290 degrees Celsius?
A. I wouldn't question it. I don't know that

detail off the top of my head.
Q. Do you -- do you remember what the boiling point is for benzene?
A. Right off the top of my head, I can't say that I really do.
Q. Do you know that benzene is a C-6 hydrocarbon?
A. I do know that, yes.
Q. If I told you its boiling point was 80 degrees Celsius, does that sound right to you?
A. Sure, that sounds reliable.
Q. Do you understand that solvents with an initial boiling point above 104 degrees Celsius usually contain little benzene?
MR. DuPONT: Form.
A. Well -- and that's why -- I mean, I do. And that's why, you know, what I tried to reflect in my estimates was, you know, the information that's available about the benzene content of hydrotreated petroleum distillates, which, you know, that's why I used the values of 10 and 100.
Q. You recognize that treatment technologies like hydronation [verbatim] significantly reduce the benzene content of the petroleum distillates?
MR. DuPONT: Form.

A. I do.
Q. Do you agree that after hydrotreating the petroleum distillate in the CRC 3-36 in 2008, that it would have been unlikely for that petroleum distillate to have had even as much as 10 ppm benzene?
MR. DuPONT: Form.
A. Well, I -- you know, I actually don't know that. I mean, what I'm looking at is, you know, the -- the blend of -- of materials that are in here, because, you know, as you point out, he does have that hydrotreated -- like distillates. There's also 15 to 25 percent of these solvent refined heavy paraffinic distillates.
And so, you know, that's why, you know, based on information that I found in the literature, I thought that the benzene content, you know, reasonably would have been between 10 and 100.
Q. Okay. Is it your testimony that the inhibited paraffinic oils would have had benzene?
A. You know, I don't really have any information. You know, they consider that to be proprietary information, so I really don't know what that inhibitor blend refers to.

Q. And, then, the other piece of this or component of this is carbon dioxide, if I'm recalling --
A. Right.
Q. Okay. And that doesn't have any benzene; is that right?
A. Right.
Q. So just getting back to the petroleum distillates, do you agree that after hydrotreating the petroleum distillates in the 3-36 as they existed in 2008, that after hydrotreating those petroleum distillates, it would have been unlikely for them to have as much as even 10 ppm benzene?
MR. DuPONT: Form.
A. But, you know, my impression is -- and I'm referring really to -- there's a World Health Organization document that I referenced in one of the footnotes, and they were the ones, you know, who concluded that the hydrotreated materials containing -- I think they said less than .1 percent to low part per million levels -- I think that -- those are the words that they used, so that's why I thought it was -- it was reasonable to bracket it and say, Okay. Well, low-part-per-million level, I'll -- I'll give it a

10. Less than .1 percent, that would be 100; and so the -- the truth is in the middle somewhere.
Q. So if I asked you for your authority for the proposition that the petroleum distillates in the CRC 3-36 after hydrotreating could have contained as much as 10 ppm benzene, it would be that WHO citation you just gave us?
A. Right, it's that environmental health criteria document; right.
Q. Your report does not calculate peak exposures; is that correct?
MR. DuPONT: Form.
A. That is correct, yeah.
Q. And why doesn't it?
A. Well, what I tried to do was use the exposure information that I thought was most representative of what Rhyne really used. And so, for example, in some of the Liquid Wrench uses, for example, the data that we had was for a 60-minute exposure, which, you know, strictly speaking, isn't really a peak exposure, but it's a short-term exposure.
And so that was, you know, really the basis for choosing the intervals that I did.
Q. How did you come to rely, at least in

part, on the ART model in this case?
In other words, why did you pick that model?
A. Well, what I tried to do, you know, kind of, the philosophy around the ART modeling approach is that it's based on scenarios. And so if you're looking at, say -- like, in my case you see in this report I used three approaches: You know, if there was historical measurement information available, you know, that was one of the things I considered using. In other cases --
(Environmental noise.)
Q. Do you want to just finish so you don't lose your --
A. Sure.
Q. -- and then we'll see what's going on.
A. Yeah, in other cases where it looked as though there was a good scenario available that was a fit for the ART model -- for example, the parts washers -- that led me to use the ART approach.
In other cases -- like where the Liquid Wrench was used in the honing and sawing operation -- there really wasn't a good scenario that fit the ART approach, so I used the two-zone approach.

(Discussion off the record.)
(Recess was taken.)
Q. Doctor, the ART model was developed to assess chemical exposures from consumer and industrial products under a chemical policy in Europe called REACH; is that correct?
A. That's correct, yeah.
Q. And the ART model is a free online program; is that correct?
A. Yes, it is.
Q. And it simulates exposure to various substances from various activities that users create through exposure scenarios by selecting predetermined options regarding the product that's used and the circumstances under which it's being used; is that correct?
A. Yeah, I think that's fair.
MR. DuPONT: Form.
Q. And, then, those inputs are put into a simulator, and an algorithm is run, and then you come out with a value. I don't mean you come out with a value; the model spits out a value; is that right?
A. Yeah, the only other thing I would add is, you know, the algorithm then is calibrated against

a set of data that's built into the system, and so you wind up with an estimate that is based on the results of the algorithm, which is, sort of, the physicochemical properties of the product -- or the material and the size of the room and the type of process and this kind of thing, and then that algorithm output is -- is dropped into a model, along with the calibration data, and that's what gives you the model outputs.
Q. What -- what is the calibration data in the system?
A. There's a dataset of -- I think it's probably 2,500 or 3,000 measurements that people have put in there, and so they're measurements of exposure that are characteristic of the -- the scenario that's being modeled. And so if you are spraying a solvent, the calibration data is measurements of solvent concentrations associated with spraying.
Q. Is all that data from Europe?
A. I think there's a good chance it is; probably, yeah.
Q. You're not aware of any data in the ART model calibration that is from the United States; is that correct?

A. I -- I don't know that there is. I don't think there is, yeah.
Q. Has the ART model ever been validated?
MR. DuPONT: Form.
A. Well, "validation's" an interesting term. You know, it, sort of, implies that you -- you know the ultimate truth and you compare your model or your measurement against that, you know, knowable truth.
So I would say, you know, on that basis, really, none of these models have been formally validated. I think a better term to apply is that their -- their performance has been evaluated. I think that's a better way to put it than saying its validation.
Q. When you say none of these models have been evaluated -- I'm sorry -- have been validated, what models are you talking about?
A. Well, the ART, for sure; and, then, also if we look at, say, these two-zone models that have been around for awhile that were originally -- well, not originally, but at least right now are available through the American Industrial Hygiene Association, there's, you know, quite a lot of studies people have done where they use the -- say

the two-zone model and -- or one of those AIHA models and generated or predicted or an estimated exposure and then compared that with a measurement of exposure to see how well they agreed.
Q. Are you talking about the Near Field/Far Field model?
A. I'm sorry. That's what I meant by two-zone.
Q. Okay.
A. Yup.
Q. Has the ART model's performance ever been evaluated for an aerosol spray in the way Mr. Rhyne says he used the CRC product in the setting he says he used it when he used it?
MR. DuPONT: Form.
A. Good question.
I think so, because that's actually one of the -- you know, I brought some articles I'd like to try to get into the record that were just recently published, where the performance of the ART model was evaluated by comparison with measurements of exposure, and some of those measurements were -- involved liquids that were being sprayed.
Q. Okay. Do you want to just identify the --

the articles that you referred to --
A. Sure.
Q. -- a few times there.
A. I've got the -- and I brought the full copies, 'cause I know they didn't get into the record.
I mean, these are all recent publications, but they all, you know, speak to the issue that you are raising -- you know, the question about how well these different models compare with measurements of exposure.
Q. Okay. Would you mind just handing, you know, and I'll -- I'll mark them.
A. Okay.
Q. Is that part of this also?
A. Oh, this is a third one. Sorry.
Q. Are these all of them?
A. That's the three, yeah.
MR. FISHKIN: So I'm going to mark as Herrick 5 in a single exhibit the three articles that Doctor Herrick just handed to me. First one is: "Accuracy Evaluation of Three Modeling Tools For Occupational Exposure Assessment."
Lead author is Spinazze?
A. Uh-huh.

Q. Next is "A Study of the Validity of Two Exposure Assessment Tools: Stoffenmanager and the Advanced Reach Tool."
Lead author is Landberg.
And the third is: "Evaluation of Exposure Assessment Tools Under REACH: Part Two -- Higher Tier --" Models [verbatim].
Lead author is Lee.
And all those are a single exhibit.
(Exhibit Herrick 5, articles: "Accuracy Evaluation of Three Modelling Tools for Occupational Exposure Assessment; A Study of the Validity of Two Exposure Assessment Tools: Stoffenmanager and the Advanced Reach Tool; Evaluation of Exposure Assessment Tools under REACH: Part II -- Higher Tier Tools.")
Q. So, Doctor, which of these -- which one or more of these three do you rely on to conclude that the -- the model -- the model's performance was evaluated for aerosol sprays in a way that Mr. Rhyne says he used the CRC's product in the setting he says he used it?
A. Let me just take a look to make sure I give you a good answer on that, 'cause in the one

by Spinazze, they -- they looked at organic solvents as one of the scenarios, and -- but I'm just trying to look at it quickly to see if I can identify which ones of those might have involved spraying.
(Witness reviews document.)
Well, here's one, for example, that looked at cleaning solvents, and this was in a -- degreasing operation that included a spraying step, so --
Q. Which one -- which article are you referring to?
A. I'm looking -- it's actually the one that we've talked about -- or might talk about later. It is a Plisko and Spencer article on part cleaning.
Q. Was that -- was --
A. And --
Q. I don't mean to interrupt you.
Was that part of Exhibit 5?
A. Well, what I'm looking at is the -- the studies that they did the comparisons on. So one of the studies that they looked at -- this is their No. 6 -- and it's -- it references the data that was published by these other guys, by Plisko and

Spencer.
Q. Okay. For the record, what -- what article is that in?
A. Oh, that's in -- Plisko and Spencer is --
Q. No, what --
A. I'm sorry. This is in Spinazze.
Q. Okay. Go ahead. Thank you.
A. Sure.
Q. Anything else?
A. Do you mind -- I'll just flip through and see if I can --
Q. Sure.
A. -- you know, give you a good answer here, 'cause some of them look more at solvents, and others looked at dust and things like that.
So I'll just see which processes, types of industries, and scenarios they looked at. (Witness reviews document.)
Here we go. Well, so, on the one by Landberg, one of the operations they looked at was spray painting. So it's -- you know, it involves an aerosol, you know, being -- being applied. So it's not identical to what he used, but it does involve spraying. So that --
Q. Was --

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A. I'm sorry.
Q. Was that one referred to in your Bayesian model results for the CRC ART model?
A. No, I don't think so.
Q. Okay.
A. And just so -- since we're on it, you know, I typically didn't use the Bayesian corrections very often --
Q. Yeah.
A. -- because frequently they came up with higher -- higher values.
Q. Okay. We'll talk about the Bayesian.
A. Sure. Okay.
Q. But I'm interrupting. I'm sorry.
A. No, that's fine.
So that's -- so I would say Landberg, you know, does including painting as one of the activities, you know, that involves spraying a product around.
And, then, this one by Lee, I just want to see what scenarios they mention they looked at here. (Witness reviews document.)
Yeah, this one included they looked -- they looked at solvents, and they included spraying operations in that one. So I think I would say

that all three of them included, you know, various types of -- of solvent spraying as one of the scenarios that they evaluated.
Q. Is the ART model accepted by any scientific community for assessment of specific workers' inhalation exposures?
A. Well, it's -- I mean, if -- in terms of acceptance, you know, I wouldn't say that there's, like, any formal institutional endorsement, or, you know, certification, but as you see from -- from these, you know, articles and what's going on, they -- they are widely used.
Q. Is the ART model -- withdraw that.
Was the ART model ever intended to be used as a retrospective exposure assessment for an individual executing specific tasks in specific conditions?
MR. DuPONT: Form.
A. Well, it was in the sense that if you, you know, go back to, sort of, the origin of the ART model, a lot of the foundational work on that was done by this guy named John Cherrie, C-h-e-r-r-i-e. And you'll see he's -- he's a coauthor on most of these articles about ART.
And he really evolved that whole approach

of -- of developing these scenarios and then coming up with this approach to modeling exposure, in part because he was working on what in the benzene world is referred to as the Shanghai Study, and he and I were on an advisory group that was working together with those guys from Exxon who were doing that investigation.
And -- and Cherrie's approach was really applied and evolved in that situation where they were trying to estimate historical exposures.
Q. Has the model -- the ART model gained general acceptance in the industrial hygiene community in the United States?
MR. DuPONT: Form.
A. It has. It's actually been adopted pretty broadly. In fact, this -- in these three articles that I just threw into the mix here, it turns out that article by Lee -- the first author there, Lee, is actually a NIOSH guy. So it is, you know, being adopted, you know, at a fairly rapid pace.
Q. When you say it's been adopted broadly, who has adopted it?
A. Well, people --
Q. In the United States.
A. Well, it's a fair -- you know, a fair

amount of it is work just like this, where people are involved in trying to reconstruct historical exposures, you know, when -- when there's litigation involved.
Q. So there are certain individuals that have elected to use it or employ it.
A. Right.
Q. Okay. Has the AIHA commented on the ART model?
A. Well, they talk about it pretty extensively. You know, the AIHA has an exposure assessment committee, and they discuss, you know, the various approaches to modeling. Now, I don't recall that -- you know, AIHI as a bureaucracy, you know, at an organizational level, has actually come out, you know, with any particular comment or position about the ART model.
Q. Has the exposure assessment committee in the AIHI adopted the ART model?
A. Well, people on their committee use it. I don't think the committee, you know, as a -- as an entity has formally adopted it, no.
Q. Well, who are the individuals that you believe -- who are the individuals on the AIHI exposure assessment committee that have used the

ART model?
A. Well, one guy in particular who I've worked with is a guy named James Stewart, S-t-e-w-a-r-t.
Q. Anybody else?
A. I'd have to check back, you know, and actually see. I confess I haven't really looked to see who's actually on the committee right at the moment.
Q. Okay. Mr. Stewart works in the benzene litigation as an expert for plaintiffs?
A. He does.
Q. Okay. Has the ACGIH commented on the ART model?
A. Not formally to my knowledge, no.
Q. So there's been no adoption by the ACGIH of this model; is that right?
A. I mean, I guess to try to answer your question fully in terms of any of these professional organizations -- AIHI or ACGIH, or any of the others -- you know, I don't recall that they've formally come out and said anything about, really, any of the modeling approaches.
Q. Have you, sir -- or Doctor -- ever used the ART model outside of your work in litigation

matters and in the classroom?
A. Those have been the two primary places. I've used it in my teaching. I haven't really had occasion to use it in any of the research studies I did.
Q. All right. So outside of your teaching in the classroom and your work as a litigation expert, you have not used the ART model.
A. I think that's fair, yeah.
Q. Is the ART model used by any US agency or organization?
MR. DuPONT: Compound.
A. I'm just trying -- I don't recall seeing it, although, as I say, this -- this recent article that we just talked about by Lee, you know, Lee is -- is a NIOSH employee. So I suppose in a -- in a sense, you know, he's using it, even though it's not a -- you know, formal instrument that's used by NIOSH.
Q. Do you agree that application of the ART model of retrospective exposure assessment requires precise knowledge of the relevant exposure scenario in order to calculate an accurate prediction of an individual's exposure?
MR. DuPONT: Form.

A. Well, that's one of the comments -- and I -- and that's attributed to -- I think his name is Sikstul [verbatim] -- I forget exactly how he pronounced his name -- but he's published, you know, articles where he's talked about areas where the ART model is -- is -- needs further development, and that's actually one of the areas that he pointed out.
Q. Do you agree with that?
A. Oh, sure. I mean, you know -- and if you look at any of the documentation around the ART model, these people who, you know, have developed it and continue to refine it all acknowledge that it's -- it's, you know, it's an evolving tool, and that they're, kind of, certainly trying to improve it.
Q. Is the model intended to be a conservative model to ensure exposure concentrations would be representative of the higher end of the spectrum?
MR. DuPONT: Compound.
A. Well, what it tries to do is give you an estimate of the -- the center of -- of a distribution of exposures, and it also has built into it the capability of looking at the upper 95th percentile or the 75th percentile and also the

lower 25th percentile. So in that sense it does try to -- to give you a sense -- you know, give you a -- a midpoint value and also the high end and the low end of the exposure that's likely to occur.
Q. Do you agree that miscalculating a single input parameter can significantly distort the output from the model?
MR. DuPONT: Form.
A. Well, like any model, you know, there -- there clearly is the opportunity for -- for uncertainty to be introduced, because you're putting in variables, and the quality of the information you put in, you know, clearly does determine the -- the quality of the output.
But that would be true not just for ART. That's true for really any model.
Q. What is a mechanistic model?
A. Well, that would be something that's based, you know, say, primarily on physicochemical properties: boiling point, vapor pressure, size of the room.
Things like that.
Q. What is a higher-tiered or highly-tiered model?
A. Well, that's kind of what they're

referring to in the ART model and also the Stoffenmanager model that we just talked about, 'cause within EU there's, sort of, first-tier models, which are really meant to be, sort of, qualitative -- I'd, kind of, say rough estimates, maybe, is the way to think of it -- that give people an indication of whether they really have exposures that are high enough to be of concern or not.

And so that's a -- that's a tier 1 model.

And, then, these other models like ART and Stoffenmanager are tier 2 or higher tier models to try to quantify that exposure.

Q. So you believe the ART models is a tier 2 model?

A. That's -- that's one of the things -- higher tier or tier 2 -- that it's referred to, yeah.

Q. Is a part of the ART model a mechanistic model? In other words, does it contain two different -- let me withdraw that.

Does the ART model contain two different components, one of which is a mechanistic model?

A. Yeah, there is a -- you know, the initial prediction or input to the algorithm is based on

physicochemical properties. So it's ventilation, and molecular weight, and vapor pressure. Things like that.

Q. And is the other component in the ART model the Bayesian component?

A. Well, the Bayesian component -- you know, and that's an option. You can -- you can use that or not.

But in terms of the -- the second step in -- in that development of the exposures is the application of that calibration data to the algorithm outputs.

And so that gives you an estimate that you can then decide if you want to apply the Bayesian adjustment to it or not.

Q. Is it -- is the Bayesian component the component of the model that makes the ART model tier 2 model?

A. No, not really. You can -- you can -- the idea of the tier 2 is really that it -- it gives you a quantitative output. You know, it gives you a number. And so you can go with the -- the unadjusted value, or you can do the Bayesian adjustment, but they're both considered outputs of a two tier -- a tier 2 model.

Q. So your testimony is that the ART model, even without the -- even without the Bayesian component, is a tier 2 model?

A. Yeah, it is, yeah.

Q. Okay.

A. That's how it's considered in the -- or under REACH.

Q. Okay. Are you -- are you able to cite me to any literature that says that?

A. Well, I think we can -- you know, even just looking at these articles here, I think they -- they talk about, you know, what, they consider to be a the distinction between a tier 1 and a tier 2 model. See if I can --

Q. You don't -- if that's what you're relying on, that's fine. I mean, you're free to continue to look if you want --

MR. DuPONT: Just for the record, the witness is referring to Exhibit 5.

THE WITNESS: Oh, sorry.

Q. So are you referring to all the articles in Exhibit 5, or one or more of --

A. I was going to try to give you one -- see if there's one that actually speaks to that.

Q. Sure.

A. You know, 'cause there are articles -- here we go. Okay. So I'm looking now in the one by Landberg.

Q. Uh-huh.

A. And Landberg talks about the -- you know, this European chemical agency that administers REACH. And so they talk about following a tiered approach. The tools with a high uncertainty that are supposed to overestimate exposure are tier 1, and should be used as an initial step, and then it goes on and on and it talks about the difference between tier 1 and the tier 2.

So it -- I mean, it does get at that in the Landberg article.

Q. So you rely on Landberg for the proposition that the ART model without a Bayesian component is a tier 2 model.

A. Yeah, in other places, too. I mean, here Landberg says, "The Advanced Reach Tool, hereafter referred to ART, is the tier 2 developed by some collaborating companies, institutions and universities."

But, you know, it isn't really essential that you incorporate the Bayesian adjustment. That's not what makes it tier 2.

Q. Okay. Any other literature that you rely on for that proposition other than Landberg?
A. I could -- there's other articles published. I could find them. I don't have them -- you know, I can't give you the cite right off the top of my head --
Q. Okay.
A. -- but, you know, I think that's -- that's pretty much been what -- what people consider to be the defining characteristic between tier 1 and tier 2.
Q. All right. So what exactly does the Bayesian component refer to, then?
A. It takes another -- and this is going to get beyond my statistical capability, but I'll give you my --
Q. Well, it's definitely beyond mine, so you have nothing to worry about.
A. Well, I don't consider myself a statistician, obviously --
Q. Yeah.
A. -- but what it winds up doing is that the Bayesian approach takes what's called a -- a posterior assumption and -- and the starting point assumption -- I'm blanking on what term they

actually use -- but it essentially takes the estimate and then modifies it based on measurements of exposure that are also in -- in another database.
And so it gives you a -- a likelihood distribution of how -- how the measurement -- or how the molded exposure compares after adjustment with these measurements of exposure.
Q. And the measurements of exposure are real-world data.
A. Right.
Q. Okay.
A. They're in -- in our database.
Q. Okay. And you did not use -- in applying the Bayesian -- excuse me -- applying the ART model -- at least for the CRC product -- you did not use the Bayesian component.
A. No, and I think I can -- and in the report I think -- maybe I can find this without chewing up too much time here. One of the -- the things that's, sort of -- well, that's actually specified in using the Bayesian approach is that you should be using what they call "fully analogous data."
Q. Uh-huh.
A. And if the data isn't really fully

analogous, it -- you can -- you can get a misleading result. And in using these over the years, you know, if I didn't have my own data to upload to do the adjustment and I just used the -- the adjustments that's in the -- in the ART database, I found that my Bayesian-adjusted values were higher.
And so for the sake of, you know, doing these kinds of reconstructions, I opted to use the unadjusted values, because they were the lower values.
Q. Okay. In your -- in your report, on the last page of the report -- that's the last page -- as I understand it, that's the last page of your model for the CRC product cleaning part, the CRC aerosol; is that right?
A. I'm just looking right here. (Witness reviews document.) Yeah. Right.
So the last one -- yeah, the last three pages here, this is for the CRC product.
Q. Is that where the 100 ppm benzene --
A. That's what I am looking for. I think it is.
Q. Yeah. The one before that says 10, so I assume --

A. Okay. You've got it. Yeah, so it's for 100.
I mean, this is a good example. So if you do the mechanistic model, you get an answer of 5.9 milligrams per cubic meter. If you do the Bayesian adjustment, it's 95.
And so I thought, Well, if I'm going to be off, I'd rather be off on the side of being too low. So that's why I use the mechanistic model result.
Q. Right. But the 5.9 and the 95 -- 5.9 milligrams and 95 milligrams -- that's not apples to apples. Those are not both benzene.
MR. DuPONT: Form.
A. Yeah, those are both benzene, yeah.
Q. Okay. So my understanding was the 95 milligrams were total hydrocarbons.
You think that's wrong?
A. I think that's wrong, because -- well, I can say, 'cause if we take a look at what I put into the model, you know, I put in for benzene. You see I've got the benzene CAS number. And the vapor pressure I used is the vapor pressure for benzene. The mole fraction is the mole fraction of benzene at 100 parts per million.

Q. Yeah, and I'm not -- I'm not disputing any of that. So maybe I'm understanding this, but...
So, first of all, this ART model refers to the Bayesian model results. So am I correct in saying that the Bayesian model was initially used, but then the results were rejected? Is that what you're --
A. Well, you have the option -- you know, so the way the model -- the way the ART program runs is it takes you through -- and the first output is get is the mechanistic model result, and then you get another dropdown, and it says, Do you want to apply the Bayesian adjustment to it --
Q. Uh-huh.
A. -- you can say yes or say no.
So this case I wanted to see what it was. So I said, Sure. So I followed down and did the Bayesian adjustment. And you see what they adjusted it with was some data from spraying paint. But, you know, I took a look at the output, and I said, Well, this is -- this is -- this seems way too high --
Q. Okay.
A. -- you know, so I'll go with a more conservative value.

Q. Okay. So the data sources referred to here under the Bayesian model results, these are two studies of spray painting; right?
A. Uh-huh. Right. Right.
Q. Okay. Do you recall what they were spray painting?
A. I don't right offhand. You know, that's all, you know, available. You know, you can dig down into the underlying literature, but I don't remember as I'm sitting here.
Q. Okay. You recall the second one was furniture?
A. I'm sorry?
Q. Do you recall the second one was furniture?
A. You know, I wouldn't rule it out.
Q. Okay.
A. I -- I just don't remember.
Q. And so if I say to you that my understanding is that for the predicted 50th percentile long-term exposure is 95 milligrams, that's referring to total hydrocarbons, you're -- you disagree with that. You think that's referring to benzene.
A. Well, I'd have to look. Yeah, I mean, I think it is referring to benzene, but I'd have to look into it.

Q. Okay.
A. But in any case, I didn't use it.
Q. Okay.
A. You know, I used the lower value.
Q. And why didn't you use it?
A. I just didn't think it was realistic. I mean, I thought it -- you know, it just seemed so much vastly higher than the mechanistic result. And, as I say, if I was going to err, I wanted to err on the side of being too low.
Q. But do you agree that it's only higher if the 95 milligrams refers to benzene? It might not be higher if the 95 refers to total hydrocarbons?
A. Well, certainly possible.
Q. Okay.
A. I mean, I'd have to dig down into it.
Q. All right. Are you aware of instances where the ART model has been challenged in terms of its use in United States litigation?
A. Yes.
Q. Okay. On how many occasions are you aware that its employment in litigation in the United States have been challenged?

A. Well, I could only speak, you know, really to my own personal experience. I've used it in some other cases, and they were not benzene-based cases this. They were cases in the semiconductor industry. And I used it there and -- and, you know, people raised questions, you know, and -- and made some of the same challenges that we're talking about here today.
Q. Okay. And -- and are you aware of a Court having refused to allow use of the ART model in a litigation?
A. No. Actually, those -- I mean, I don't think those cases are -- are finished yet, but it wasn't as if they threw it out or anything.
Q. All right. Are you aware of any formal challenge that was made to the use of an ART model in litigation in the United States?
MR. DuPONT: Form.
A. I'm sorry. Help me understand what would -- what would constitute a formal challenge.
Q. Fair enough. A motion -- and you may not know, but what -- to your knowledge, has an application ever been made to a Court, arguing that the ART model is not generally accepted and should not be allowed to be used in this case?

A. Well, I -- I think I can answer that. I mean, I -- there -- in a case that I was involved in there was an expert report and raised, you know, a lot of the same questions that we're seeing here today. And, you know, there probably was a motion. Yeah, I think they probably wanted to throw me out, but I'm still in.
Q. Okay. What case is that?
A. That was one -- I'm trying to remember.
There was a series of cases -- and these are still in progress, you know, they're still underway -- that involved people who worked at Motorola. And for the most part, you know -- and you tell me what this means -- those cases have all settled.
Q. Okay. Where were those cases -- were those cases pending in a particular jurisdiction or multiple jurisdictions?
A. Good question. That's kind of a level of legal detail I don't -- I don't really remember. I think they might all be in the same jurisdiction, but I actually don't really know that.
Q. Okay. What lawyer did you work on --
A. Oh, this is the Thornton law firm. The lead guy is David Strauss.

Q. Okay. And do you know whether a Court ever ruled on the admissibility of the ART model in -- in that group of cases?
A. You know, I don't know how far -- you know, as I say, what I remember was there were expert reports -- you know, kind of like we have here -- that questioned my use of it. I wrote responses. And, you know, I think there was -- there might have been a motion, you know, to try to get the whole thing thrown out.
It never -- you know, at least in this particular set of cases, it never actually got to trial, because there was a settlement before that.
Q. Have you ever heard of a case called Boykin, B-o-y-k-i-n?
A. Doesn't ring a bell.
Q. Have you ever been retained to model workplace exposures to chemicals in the United States outside of litigation?
MR. DuPONT: Form.
A. I'm trying to think.
Would this be involved, say, with a research project if someone sponsored my research? Is that the kind --
Q. No. No, no, not research project.

A. Then, no. I would say no.
Q. Okay. With a research project.
A. Yeah, one -- there was a project that I did where we were looking at exposures to asphalt in highway paving; and we did some modeling, you know, in that one.
Q. Did you use the ART model there?
A. No. Actually, this was before the ART model was really out there and available.
(Discussion off the record.)
Q. So I want to talk about the ART model as it was applied here, at least with respect to the CRC product, but I first want to talk about some of your conclusions.
A. Okay.
Q. So as I understand it, you concluded that if Mr. Rhyne used the CRC product containing 100 ppm benzene for one hour a day, his predicted 50th percentile exposure to benzene for the one hour he used the product would be 1.85 parts per million; is that right?
A. Let me just -- we're in Table 3, I'm guessing, is that --
Q. Yes. Yeah.
A. Hang on one second. Let me just flip to

it.
Q. Well, it's actually -- yeah, I think it's before Table 3, but you know better than me.
In Table 3 you did a calculation to get to the number.
A. Oh, right.
Well, that was -- that's because -- yeah, I'm sorry. Table 3 is his daily exposure.
Q. Yeah.
A. So probably what you're describing is his one-hour exposure.
Q. Yeah.
A. And I -- yeah. Right.
So you're on page 30? Is that where we are here?
Q. If you go to -- 38, I think, is your discussion that gets you to the 1.85.
A. Right, 'cause I was trying to say, Well, okay, you know, based on the way he described his work, how long did he use the product? And, you know, so I made the assumption that he used it for an hour a day, and then, for the other seven hours, he -- he wasn't exposed from that source.
Q. So the 1.85 is a value that was calculated by the model after you input various information

into the model; is that right?
A. Yeah, that's that 50 -- 50th percentile. That would be, sort of, the number that's in the middle of the range.
Q. And -- and if he used the product with the 10 ppm benzene, it would be 10 times less than that, or .18; is that right?
A. Yeah, that's where -- that's where the .18 comes from --
Q. Okay.
A. -- yeah, that's right.
Q. And -- and is there any literature -- any published data on benzene exposures -- or other literature to which you believe those outputs or against which you believe those outputs can be validated?
MR. DuPONT: Form.
A. I'm just trying to think of, you know, the range of -- of information that's been published on spraying materials that contain these kinds of levels of benzene.
You know, aside from what's out there, you know, maybe in studies of spray painting and things like that, but right off the top of my head, you know, I can't come up with a particular source of

information.
Q. Did the value -- these values that we're talking about 1.85 and the .18, did they assume that Mr. Rhyne was using the CRC product in an aerosol can?
A. Well, the -- the model basically asks you, you know, if the application -- how it was being applied, whether it was being applied from a pressurized can or applied with a -- a hand-powered sprayer. The model really doesn't distinguish between those two.
Q. Okay. I didn't know that. All right.
A. Well, you know, the model's only a model. It just doesn't -- it doesn't know. So it asks you, you know, if the stuff was being applied as an aerosol.
Q. No, I did know that, but I didn't -- I understood you to just say that the model is agnostic or it doesn't -- it doesn't -- it doesn't matter whether you're spraying it from a pressurized can or a spray bottle.
Did I misunderstand you?
A. No. No. I think that that is the way --
Q. Okay.
A. -- the way it runs.

Q. Okay.
(Discussion off the record.)
Q. So if we go to -- if we go to Table 3, we go from the 1.85 and the .18 to the .07 and .007; is that right?
A. Right. Right.
Q. Okay. And I just want to make sure that I understand how you got there.
So my understanding -- well, first of all, is this -- is this intended to be the time-weighted average?
A. That's what it would be, yeah. That's his daily average time-weighted over the eight-hour period.
Q. Okay. So my understanding is what you did -- at least for the -- I'll take the 10 ppm benzene --
A. Uh-huh.
Q. -- 'cause I'm partial -- more partial to that one, as you might imagine.
A. Sure.
Q. So -- so what you did there is, you took the .18, and you multiplied it in the first instance by .125 because that's one hour out of an eight-hour day; is that right?

A. Yeah, to factor in seven hours when he wasn't exposed.
Q. And then you did a further calculation. You multiplied that by .30 because he used the product for 30 percent of that one hour?
A. Uh-huh.
Q. All right. And where did you get that from?
A. That was from his deposition, 'cause he talked about, you know, when he was cleaning parts sometimes he used a parts washer and sometimes he used the -- the CRC product; and you know, as I remember, he, kind of, said, Well it just depended. It was a convenience thing. It depended on how far away from the parts washer they were.
And so if they were close enough, they would take the part to the washer. If not, they would just use the spray.
Q. All right. So you were assuming that he used the CRC plod for 18 minutes a day.
A. I think that's right. Is that -- I'm just trying to --
Q. It's 30 percent of 60 minutes.
A. I think that's right, yeah.
Q. Are you familiar with the precautionary

principle?
A. As a, you know, kind of, a general practitioner of environmental health, yeah.
Q. All right. Do you understand that the precautionary principle states essentially that where there -- where a risk exists, that action should be taken to minimize it or eliminate it, even though absolute proof has not been presented that quantifies the risk?
A. I think that's a -- that's a fair statement of, you know, kind of, the underlying philosophy, yeah.
Q. It's actually a definition that I wrote down here. So...
A. Okay. Well, then, I wouldn't dispute it.
Q. Was the ART model intended as a screening tool to serve the precautionary principle?
MR. DuPONT: Form.
A. I'd have to really go back -- you know, there's a lot of publications out there around, you know, kind of, the underlying philosophy and -- and the whole approach to the -- in your model.
I have to -- you know, the whole precautionary principle applies, you know, very broadly across a whole range of --

Q. Yeah.
A. You know, things like eating fried bacon and everything else. So I guess I haven't really ever thought of the ART model as, you know, quite in those terms as really being a tool that applies to the precautionary principle.
Q. If a product complies with safety standards in Europe, according to the ART model's predictions, the product is then cleared for use in Europe; is that correct?
A. Yeah. Well, it's kind of -- it's a little more nuanced than that in a sense, because the product, you know, can still be used, but based on the output that someone gets from the ART model, you know, they could do anything from nothing to, Well, you know, maybe we better find a substitute material, or maybe we need to install some ventilation here to try to address this, or maybe we, you know, need to put people in respirators or something like that.
So there's kind of a -- a whole hierarchy of activities that -- that, you know, would flow, depending on what the ART model produces.
Q. But is it fair to say that if it complies with safety standards according to the ART's

predictions that the product is cleared for use?
MR. DuPONT: Form.
A. You know, I'm afraid I don't really know exactly how that European chemical agency, you know, would apply or how they would view a particular result from ART. So I'd have to say I guess I don't really have a good answer for that.
Q. Do you understand that if a product is not comply -- does not comply with safety measures according to the ART's predictions, that the product is not banned?
MR. DuPONT: Form.
A. No, I think that's fair. I mean, I do understand that as the idea of the whole REACH approach isn't really to -- to ban chemicals. It's to give people who make them and use them a -- a sense of, you know, what -- what the need for control is.
Q. Do you know what happens, if anything, in the assessment process after the ART model determines that a product did not comply with safety measures?
A. Well, again, you know, in some of the underlying documents that are generated around REACH and ART -- and there is that whole idea that

if something comes in with a value that's -- that's higher than is acceptable, there's a whole range of controls and -- and administrative measures that can be taken.
Q. So -- so you understand that if a product fails safety measures according to ART, that it can still be used in Europe.
MR. DuPONT: Form.
A. Oh, it's -- yeah, it may just be that it's -- you know, as I say, there's an indication that some sort of a control was needed.
Q. All right. I want to ask you some questions, Doctor, about the appendix in your report.
So what is the appendix comprised of?
A. Well, I've got the outputs from the ART model which we've been talking about, and, then, I also have the results of the two-zone modeling or the Near Field/Far Field modeling that I did -- especially for the Liquid Wrench product.
Q. So just focusing on the -- on the ART model data for a moment, are these -- I'm sorry. What are these called? Are these worksheets?
Or what do you call them?
A. Well, when you get your results, you can

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download it either as a PDF or an Excel, and so this is really the report document, I guess you could call it, the result -- reported results.
Q. Okay. So these are the reported result documents from the ART models that you ran.
A. Right.
Q. All right. Were there other ART models that you ran for which we do not have output documents in this appendix?
A. Are you referring to specifically in this case --
Q. Yes.
A. -- other models that I did?
Q. Well, I'm talking about other ART models that you did.
MR. DuPONT: Form.
Q. Do you understand my question?
A. No, I'm --
Q. Okay. I don't mean to be confusing. So...
As I understand it these -- these are -- focusing on the ART model, these are the output documents from the models that you ran?
A. Correct.
Q. Okay. Did you run output models -- I'm

sorry.
Did you run models for which we do not have output documents in this appendix?
A. No.
Q. Okay.
A. These are the -- these are -- you know, 'cause before I ran the models, you know, I tried to, you know, kind of, lock in on the input conditions and, like in the case of CRC, you know, what were the concentrations, and -- well, actually, you know, let me -- no, it wasn't in this case.
I mean, just to -- not to belabor the point, but, you know, one of the things I was interested in -- not on CRC, but on the results around the parts washer -- you know, the mineral spirits parts washer -- one of the questions had to do with the comparison I made between my model and these estimates that had been generated by Fedoruk in his papers.
And one of the differences there was that the temperature that I assumed in the room was 25, and he assumed 19 or 18 I think. So I did run a model just to see how different the results would be at those two temperatures.

Q. Okay. So you didn't run the ART model for CRC with any input conditions other than what I am seeing in this appendix.
A. That's -- that's a fair statement, sure. That's -- that's right.
Q. Okay. If you could go to your ART model for the CRC product, and it's dated 29 July, '19. It's the cleaning parts with CRC aerosol 10 ppm benzene.
A. Yeah, let me just flip to it.
Q. I think it's, like, four or five pages from the end.
A. Yup.
(Witness reviews document.) Yup. I've got it.
Q. Okay. So on each of these output -- these are output reports, I think you said?
A. Well, what this gives is, you know, essentially it recounts for you what you put in, you know. And so in this case, you know, there was only one activity. You can model up to four activities. I only, you know, did it for one.
Q. I'm just trying to remember. What -- what were you calling these? Output reports? Is that acceptable to you, or --

A. Yeah, that's what they --
Q. Okay.
A. -- you know, they call it -- their title at the top says "ART Report," so I'd say --
Q. That's a good -- that's a good thing to call it. Let's just call it that.
A. Sure.
Q. So each report has a date on it.
A. Right.
Q. This one has 29 July, '19.
A. Uh-huh.
Q. What is that referring to?
A. Oh, that would be the date that I created, you know, this information -- that I inputted to the -- to the model.
Q. Okay. That's the date you ran the model.
A. Uh-huh -- yeah.
Q. You testified earlier that you were physically in front of the computer, inputting the data, and waiting for the result.
A. That's -- that's what it would mean, yeah. Yeah.
Q. Okay. So I see here ART version is 1.5. When did 1.5 come out?
A. Good question. I mean, it's -- it's

probably been a couple of years, 'cause that was, you know, part of this, kind of, evolutionary process that -- that we were talking about. And -- and so it's been at least a couple of years -- could be at least three years.

I'm just trying to think when I was -- you, know when I used it in class.

I'll say three years.

Q. And, then, under "Date created" we see again 29 July, 2000 -- '19, I assume that is?

A. Uh-huh.

Q. Then there's a "Date last edited" of 1 January '01.

What is that?

A. Good question.

That's -- that's in there. I didn't input that data. That's -- that's, you know, generated by the program itself, and I'd have to look in and see what that refers to.

Q. Well, if we go back to the -- if you flip a few pages back in your report, there's an ART model -- I'm sorry -- there's an ART report "Fresh Mineral Spirits Parts Washing, 21 June, '19."

I went back three or four pages.

A. Okay.

Q. Do you see that there?

A. I'm looking. (Witness reviews document.) Oh, here we go, yeah.

Q. Okay.

A. Uh-huh.

Q. So -- so that one is dated 21 June, '19 and it's got a "Date created" of 19 June, '19.

A. Uh-huh.

Q. So I guess the first question is: Do you know how those two dates can be different, recognizing they're a couple of days off?

A. Are you referring to that "Date last edited"?

Q. No, I'm referring to the "Date created," 'cause I thought what you just testified to with respect to the CRC report -- ART report was the -- the 29 July, '19, date was the date it was created, and you see that on the CRC ART report --

A. Uh-huh.

Q. -- two places. Here there's a two-day difference. I'm just trying to understand why that is.

A. I'm sorry. I'm not following the two-day difference.

Q. So --

A. 19 June, '19?

Q. No. I'm sorry. There's a date at the top.

A. Oh. Oh. I'm sorry. Gotcha. Gotcha.

That's just the title I gave it. You know -- and so it's -- it's possible that I, you know, I dropped in the wrong date on the -- on the title of the report that I --

Q. Okay. And -- and on this report it says, "Date last edited," 19 June '19 --

A. Uh-huh.

Q. -- which is the same date it was created.

A. Yeah.

Q. So I'm wondering why this CRC ART report doesn't contain the same date it was created, which was 29 July, '19.

A. Yeah, that's a really good -- I don't know the answer to that, I'm afraid. If I could go take a look at some of the others.

Q. Was the ART report for CRC 10 ppm benzene edited at any time?

A. No, it would have -- you know, I think that would have been reflected in that "Date created" if I had gone through and -- and plugged in new numbers.

So -- and, you know, that -- that "Date last edited," that's -- that's so far back in time, I don't even understand where -- how that got in there.

Q. Okay. So if we -- we move forward with the CRC ART report --

A. Okay.

Q. -- again, we're on the one for 10 ppm benzene.

A. Uh-huh.

Q. Next page: "Emission sources, Near Field, Far Field" -- "Near Field" is checked. "Far Field" is not.

A. Yeah.

Q. What does that reflect?

A. Well, what it let's you do is establish whether there's more than one source. And so, for example, when Mr. Rhyne was doing this parts cleaning, you know, what I assumed in here was that he was the only source of exposure. So he was in his own near field.

If there had been somebody, say, right across the work table or the bench or something from him who was doing a similar process or generating benzene from some other source, you

know, Rhyne would have been in that person's far field. And so you can add that -- what they consider a secondary source, and that's what would happen if you checked the "Far Field."
Q. What does "Process temperature" refer to?
A. That would be the -- the room temperature. So in this case, you know, he's got those metal parts, and, you know, the room temperature. In -- in the case, you know, that -- that I used here, I assumed it was 25 degrees C, since he was in North Carolina.
Q. I'm sorry. I saw -- for "Process temperature" I see "298 K."
A. Well, that's Kelvin. It's just -- you know, it's just another scale of -- of temperature, but the way the ART system is set up, you have to put the temperature in in degrees Kelvin, and so that's where the 298 comes from.
Q. And what does that convert to in Celsius?
A. That's 25 C. That's the same as about 77 Fahrenheit.
Q. Okay. Vapor -- by the way, lower process temperature, how does that change the output? Or higher process temperature, how does that change the output?

A. Yeah, it does have an effect. If you go to a lower temperature you wind up with less vaporization, right, of the benzene from the liquid. And so lower temperature gives you lower airborne concentrations; and vice versa: If you go with higher temperatures, the concentration goes up.
Q. And I'm sorry. You may have included this in your last answer, but how did you get to 77 degrees Fahrenheit?
A. Oh, well, I -- you know, that was my, you know, kind of working assumption to say, Well, where is this guy doing his job? He's in North Carolina. So what's a reasonable indoor temperature in North Carolina? And so I used 25 C.
Q. Okay. And the model allowed you to -- as I understand it, in certain places a model contains three to five selections that you can make for a particular variable.
A. Yeah. Well -- like -- yes, and in some cases like, you know, in this thing about -- where you talk about the activity class --
Q. Uh-huh.
A. -- under spraying, "Spray direction," you know, so you can say spraying overhead, or spraying

in any direction.
Q. Yeah.
A. And so, you know, my way of visualizing what he was doing was that he had the part on the table before him, and he was spraying horizontally or downward.
Q. Okay.
A. So, yeah, the menu gives you maybe four choices.
Q. For "Process temperature," is it fair to say that you're not limited by those choices; that you could pick any process temperature you'd like?
A. You can. That's a free field.
Q. Okay.
A. You can enter the number yourself.
Q. "Vapour pressure," what is that referring to?
A. Well, that's the inherent property of the -- in this case benzene -- to evaporate from the liquid to the vapor phase. And so that's -- and that's a standard number that you look up in a table.
Q. And the "Liquid mole fraction --" that "Liquid mole fraction" is 10 ppm?
A. That's the concentration, right,

comparative mole fraction.
Q. All right. You mentioned a moment ago what the "Activity coefficient" -- here it's 1. That's reflecting the fact that you were modeling for a single activity?
A. Well, actually, it's a little more related to the -- the concentration of the material in -- in the overall mixture. And so 1 is, kind of, a default value for a dilute solution like this.
Q. Next is, "Activity class: Surface spraying of liquids."
A. Uh-huh.
Q. What -- what were the choices there?
A. Oh, good -- I'd have to remember. I'd have to look into it. I mean, this is one of those where, you know, it gives you three or four choices, I think. And I think right off the top of my head I'm not -- I'm not remembering what the other ones were.
Q. Okay. Are you aware of any data that speaks to the amount of product that's released from an aerosol can per spray?
A. There is some data. I -- I remember at one point in the past doing a calculation on that. You know, I think it varies quite a lot, though,

depending on the product. And so, you know, what you try to -- if you need to do that, you do try to find information about, you know, the total volume of the liquid in the can -- you know, so there's propellant in there, you know, carbon dioxide or whatever -- and the -- so you've got the mass in the can; and you've got the -- try to find out the number of times someone sprayed before a can was empty, and then do a calculation of the mass that was released each spray.

Q. Do you know what the range was in -- in that study or those studies?

A. You know, I don't. I did it once for a calculation. You know, I don't know that I've seen much published on that.

Q. Are you aware of any data that speaks to the rates of product released from an aerosol over time, whether it be a second, a minute, or some other measurement?

MR. DuPONT: Form.

A. You're talking about, like, the evaporation rate of, say, the benzene from the aerosol or --

Q. No, the amount of product that comes out when you depress the spray top over time.

A. Well, I think that's, kind of, what -- well, if we look at the choices here where it says, "Situation" I think that's what that's to address is the application rate -- so the volume that's released per minute.

And so, you know, in this case I chose the low rate, you know, that -- 'cause I didn't really have, you know, data from -- from Rhyne's discussion of how he actually used the product. So, you know, I, kind of, again tried to make a -- a conservative assumption to say, Well, I'll just say it's a low application rate.

Q. Did you make any determination as to the amount of the CRC product you believe Mr. Rhyne used on an average daily basis in the years that he used the CRC product?

A. I think -- I think it's in the report. I'm not -- not coming right off the top of my head, but I thought in the discussion he mentioned the amount of product that he used, but I have to do that --

Q. Can you check on that? I don't know if it's -- because I didn't believe that he did, but maybe I'm wrong.

A. Okay. No. No. It's possible. I'm just

-- you know, there was, kind of, a lot -- he talked about a lot of stuff here, and so I'm not sure I --

Q. To save time --

A. Okay.

Q. -- to the extent that you -- if Rhyne -- so I think my question is did you make a determination of how much product he used? If you did, it would have been based on his testimony?

A. Uh-huh.

Q. And if he didn't testify to it, then you did not make a --

A. It wouldn't be there. So I would, kind of, default to this low rate.

Q. Okay. Do you know if Mr. Rhyne used one -- used more or less than one can or spray bottle of CRC per day in the years that he used the product?

A. You know, again, I -- without going back to his testimony, I really don't remember that.

Q. Okay.

A. In fact, it -- I can't even -- I don't actually remember if he was even asked that. But I -- I don't have that in mind.

Q. Okay. What were the choices for application rate that you could have selected? --

recognizing that you selected low application rate.

A. Uh-huh.

Q. Okay. What were the other choices?

A. Well, you could go up medium and high application, because, you know, as you see, one of the other things that is, sort of, implicit in this is the spray technique. And so the spraying, you know, you can apply this surface spraying activity to spray painting, for example. And so there, you know, you might have, you know, a much higher application rate or you can use it -- you can apply it to spraying a pesticide.

So, you know, where you're trying to really put out, you know, much larger volumes of material. So those are the kinds of options you have. And that's why, you know, given what I could, sort of, infer from his description of the process, I chose the low rate.

Q. So just tell me: What -- what were the choices? I think you said there was low; there was medium; there was high.

A. I think so. You know, again I'd have to refer to the -- to the -- you know, to the package itself, but I think that those are definitely included.

Q. So -- so when you're sitting at your computer, running the model, the choices are in front of you on the screen?
A. Uh-huh.
Q. Okay. Do you recall that there was a very low choice?
A. Well, you know, I wouldn't rule it out. There could have been, yeah. Yeah.
Q. Okay. So I'm going to ask you to assume for the moment that there was a very low choice, and I'll tell you what I think it was --
A. Okay.
Q. -- I believe that the very low application rate was less than .03 liters a minute.
A. Okay.
Q. All right?
A. That would fit with what they said for low, yeah.
Q. And low was .03 liters per minute to .3 liters per minute; is that right?
A. Right.
Q. Okay. So low, in essence, means 1 ounce to 10 ounces a minute? -- if you accept that a liter has -- I think it's, like, 33, 34 ounces or something?

A. Uh-huh. Yeah, I would accept that. I think that's reasonable.
Q. Okay.
A. Sure.
Q. So, again, accepting that there was a very low option, why did you choose low, rather than very low?
A. Oh, well, I don't -- I mean, I think that's a fair -- a fair question. It could have -- you know, this was, kind of, a -- a call based on fairly limited information from him about the way he used the stuff. So that -- you know, I chose low. It -- it -- you know, I could have chosen very low.
Q. Do you agree that selecting very low would have reduced the predicted benzene exposure level by approximately three-fold?
MR. DuPONT: Form.
A. You know, I'd have to take a look at it. That seems like a -- like a really big reduction, but I -- you know, I could -- I could certainly run the model and -- and see if it reduces it by that much.
Q. Do you recall that Mr. Rhyne testified that when using the CRC product to clean nuts,

bolts, and washers, he would lay the part on a rag on his toolbox and then spray it and wipe it off?
And I'm getting that from page 13 of your report.
A. Uh-huh. That -- that does sound really familiar, yeah.
Q. Would you agree with me that that suggests that he's spraying downward?
A. Well, I think so. Although you remember, you know, he -- he talked about, you know, cleaning tools of -- or cleaning parts of all kinds and sizes --
Q. Uh-huh.
A. -- and the things called "end bells," which were, you know, larger; you know, 8 inches, I guess, in diameter. And so, you know, if it was a nut or a bolt or something and he had it on the table in front of him, you know, we could make the case that it was definitely a -- primarily a downward spray.
If it was a larger part -- like he was cleaning that (indicating) -- I could imagine there was a horizontal component to it.
Q. Okay. Do you see -- and, I mean, you're right. He was not only cleaning nuts, bolts, and

washers, there was testimony about end dams and some other products that were larger.
A. Uh-huh.
Q. Did you see anything in the record that suggested that he cleaned those other parts -- those larger parts -- in anything other than a downward motion?
A. You know, I -- I don't remember the -- you know, there was really that much detail in -- in the record about, you know, kind of, the exact technique that he was claiming.
Q. So for "Spray direction" you -- you checked or you selected only horizontal or downward; is that right?
A. Well, yeah, because, you know, the contrast would be, you know, was he spraying overhead with something? And so, you know, he clearly wasn't doing that. So that was why I wound up choosing this.
Q. What were the other choices, other -- other than "Only horizontal or downward" or overhead?
A. You know, I just -- I'm afraid I just don't remember. I'd have to look into it.
Q. Do you recall that one of the choices was

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downward?
A. I wouldn't rule that out. Sure, that could have been.
Q. I'm going to ask you to accept that one of the choices was only downward.
A. Uh-huh.
Q. Can you tell me why you elected to choose or select "Only horizontal or downward," as opposed to only downward?
A. Well, it was partly, you know, because, as we just assessed just a minute ago; that, you know, if he was cleaning these -- what do they call it, end bells or something? -- these larger parts, you know, that part was big enough that, you know, he -- in order to spray on it, you know, he would have very likely been spraying both downward, as well as horizontal to hit the surface.
Q. And where are you getting that it was -- that he would have been spraying not only downward but horizontal?
A. I'm just --
Q. That's what I'm trying to understand.
A. Well, I'm trying to visualize the actual movement around these things that are -- you know, he says, "Anything above 8 inches on the end bell

would not be cleaned on a parts washer, instead CRC was used."
So, you know, if that's the diameter of this part called a parts washer -- or, I mean, called an "end bell," you know -- say an 8-inch piece about this big -- in order to spray to get the -- you know, to get the cleaning solution onto the surface, you know, I think it very likely that he was spraying horizontally, as well as downward.
Q. You're assuming the 8 inches is height, not length?
A. Well, I'm thinking what an end bell, you know, must, kind of, look like, and I haven't run across one lately myself, but, you know, it's some metal object, you know, with a diameter of 8 inches. So if I'm -- if it's sitting here on the table in front of me and I need to, you know, get the spray onto the surface so I can clean it, you know, I'm spraying horizontally, as well as downward, to get surface coated.
Q. But if you're standing up and it's sitting on the table if front of you, aren't you spraying down?
MR. DuPONT: Form.
A. Well, again, I don't know enough about,

you know, the way his workstation was really configured -- or even if he was standing. I mean, I don't think anybody, you know, really got to that level of -- of detail in terms of his work practices.
Q. Do you know what effect the selection of only downward would have had on the predicted benzene exposure to the CRC product under the ART model?
A. I don't know. I haven't looked at that.
Q. If we go back to the -- the ART report that we were just talking about, there's a -- and are all these modifying factors on the left-hand column of the page that we're on?
A. Yeah, those are all, you know, as you go through the one screen after another, it presents you, you know, with these fields; and, then -- and so, you know, some of these are -- you know, like, the free text field, like, where you can drop in the mole fraction. And then you go to the next page, and it asks you what the activity class is, and it gives you a series of choices; and you, you know, check the surface spraying with liquids and then it takes you to another set of choices.
Q. So each of these is a modifying factor?

And I'm not --
A. Uh-huh.
Q. You just have to answer --
A. Oh, I'm sorry. Yes.
Q. Okay. 'Cause I -- I've read literature that talks about the fact that there are nine modifying factors in the ART model, and I see -- and if each of these is a modifying factor, I'm seeing more than nine.
A. You know what? I think what they're probably referring to is, you know, kind of, those big, bold headings where it says, "Operating Conditions," or -- yeah, "Operating Condition, Risk Management Measures," I mean, that's --
Q. That's only two.
A. That's only two, yeah. No -- yeah. Okay. I'll have to --
Q. I may be misremembering, but I thought it was --
A. I don't remember --
Q. So -- okay.
A. -- the nine either.
Q. All right. We'll move on.
So "Spray technique," what is that? What were the choices there? You -- you selected

"Spraying with no or low compressed air use."
What is -- what were the choices?
A. Yeah, well, the other -- at the other extreme, you know, you could -- and there may be something in the middle, but as I recall the other extreme would have been, you know, using high-pressure air like you would with spray painting.
Q. Okay.
A. So that's, kind of, at the other end of that spectrum.
Q. Do you recall something on the lower end of the spectrum below "Spraying with no or low compressed air use"?
A. I don't really. It's possible there was one maybe for manual pulping or something like that, but I actually don't remember, sitting right here.
Q. Do you recall how you came to select "Spraying with no or low compressed air use"?
A. Well, I -- you know, it was clear that he didn't have compressed air, you know, as the driving force to create the aerosol. He was using either the pressure air from the carbon dioxide in the aerosol can, or when he was using the spray

gun, you know, it was just the mechanical force that he produced as he pumped the sprayer.
Q. Next section is "Surface contamination -- Process fully enclosed." You have no -- what is that referring to?
A. Yeah -- well, if you were spraying in a booth, for example, like a laboratory hood or something like that, where you were -- the -- the part that you were spraying is isolated inside some kind of a booth and you're standing on the outside, that would be a full closure.
Q. "Effective housekeeping practices in place" and general -- I'm sorry. "Effective housekeeping practices in place," you entered "No" there.
A. Right.
Q. What is that referring to?
A. Well, it gives you -- when you're actually in the program, it gives you some examples, you know, of are there, you know, special cleaning procedures; are there, you know, disposable materials, I suppose, in place. You know, any -- you know, and -- and from what I could conclude about the way he did the job, none of those really applied.

Q. Do you know -- and the other -- I assume there was one other choice, and the other choice was yes, or am I --
A. Yeah, I think --
Q. Okay.
A. Yeah, I think so.
Q. Do you know what a yes answer would have done to the calculation here?
A. I don't. I don't.
Q. And, then, "General -- general housekeeping practices in place," you wrote "Yes" or you entered "Yes."
A. Right.
Q. What's the difference between "Effective housekeeping practices in place" and "General housekeeping practices in place"?
A. I think the way they -- what they're trying to get at there is, you know, is there like, sort of, a particular specialized housekeeping that applies to that process, as opposed to general housekeeping throughout the facility; and so on that basis I -- I said "Yes" to the "General."
Q. And where are you getting that distinction from when you say that that's what it's referring to?

A. Well, I think -- I mean, I -- I'm trying to remember back, you know, as -- as you go through the user's guide for ART, it explains what the -- you know, what they really mean by the -- by the language in the selection that you make. And so that's where that kind of information would be, is in the ART user guide.
Q. Did you review Mr. Rhyne's testimony concerning the size of the buildings where he worked at the Catawba facility?
A. I did.
Q. Did you consider that testimony in running the ART model?
A. Well, I did here in this case, because, you know, based on the way he described doing these parts-cleaning activities, it -- it struck me that he could be doing them almost anyplace.
And so -- 'cause you remember one of his things was that, you know, they were doing this out on the shop floor, and depending on how far away they were from the parts washer, they would either use the CRC product, or they would take the part, you know, into the -- into the room where the washer was.
So, you know, not being able to, kind of,

pin down where he was likely to be doing it, I just said, Well, we'll give it any size workroom.
Q. All right. Do you recall that he testified that the rooms that he worked in at Catawba were very large?
A. Some of those, yeah, definitely were, yeah.
Q. All right. Did you see anything in the materials that you reviewed in connection with this case that contradicted Mr. Rhyne's description of the size or sizes of the rooms that you worked in at Catawba?
MR. DuPONT: Form.
A. Well, let me try to understand it. I mean, you know, he did work, you know, say in the pipe shop, you know, in some of these places, and he worked in areas that were, you know, more confined than the general workroom space, but I don't -- I didn't consider that to be exactly a contradiction.
Q. Yeah. No -- and I don't believe it is either. My question may not have been a good question.
So you've got testimony from Mr. Rhyne about the size of the workrooms -- however big or

however small they were.
A. Uh-huh. Uh-huh.
Q. Okay. If we were to put that on one side, did you see anything in the -- in the record that contradicted any of his testimony about the size of the rooms that he worked in?
A. Oh. I see what you're saying.
No, not really, 'cause, you know, he had his discussion, and then, you know, some of the exhibits were hand-drawn, you know, sort of, floor plans of the spaces that he was in, but I didn't really see that there was anything that contradicted his recollections.
Q. Do you recall that Mr. Rhyne testified that the auxiliary building in which he worked had 4 floors and was 10 times larger than his deposition room with a ceiling height ranging from 10 to 14 feet?
Do you recall that?
A. That does sound true, yeah.
Q. Do you recall that he estimated that the reactor building that he worked in was 60 feet in diameter and at least 100 feet tall?
A. That sounds familiar, sure.
Q. And do you recall that he testifies or he

described the turbine building as having three floors that were 100 by 120 each, with a ceiling height of 14 to 16 feet?
A. I do recall that, yeah.
Q. Okay. What were the other -- so for room size, you picked any room size; is that right?
A. Right.
Q. And, as I understand it, any room size means that he could have been working in rooms as small as 300 square feet or as large as 3,000 square feet; is that right?
A. Yeah, 'cause it -- it -- the way the model does -- it partitions; if you choose any size, it partitions off into, sort of, I think three categories of room size.
Q. What were the other choices that you could have -- or the other selections you could have made for room size?
A. Well, if you choose indoors, then, if you know, you know, exactly the particular floor -- say the volume of the space, I think there's three or four room volumes, and you can choose and -- and specify that.
Q. Is --
A. But --

Q. I'm sorry.
A. Oh, no, but just in -- you know, in this case, I mean, you know, just, again, I'm, kind of, reflecting on my own experience. You know, I've done a decent amount of work in nuclear power plants, and I -- you know, I know there are, you know -- even though as you say -- and as he recalled -- you know, on a macroscale, the rooms are really huge; these are enormous buildings, but within these spaces, you know, there are smaller rooms that are partitioned off and -- and, you know, isolated to some extent from the general plant area. And, you know, that was why, you know, not really knowing a whole lot of detail about where he really worked at a given moment, I just used that.
Q. You've never been to the Catawba facility; is that correct?
A. I have not.
Q. Okay. Did you see any record evidence that he worked in these separate rooms, as you've described them?
A. I don't think anybody really asked him, you know, that -- that kind of information about this particular activity he was conducting.

Q. So one of the other options that you could have selected rather than "Any size workroom" would have been "Large workrooms only"; is that right?
A. I think that's one of the choices, yeah. Yeah.
Q. And do you know what size large workrooms are?
A. Right off the top of my head, I -- I know, you know, just trying to visualize what's in the -- in the menu that drops down and gives you your choices, it has room volumes in cubic meters, I suppose, but I don't remember what number they applied it at.
Q. Why didn't you choose "Large workrooms only"?
A. Oh, well, just 'cause, as I said, as I was thinking about what I recall from the configuration of these power plants, you have a lot of big, open space, but you also have areas that are either enclosed or semi-enclosed, and I didn't want to rule out the possibility he was working in both.
Q. Okay. And what power plants are you referring to there?
A. That I've been in?
Q. Yeah.

A. Oh I've been in the Millstone plants in Connecticut --
Q. Uh-huh.
A. -- when they were under construction. I spent, actually, a fair amount of time there.
Q. Okay. Do you know what the selection of "Large workrooms only" would have done to the result of this model -- to the predicted benzene exposure level?
A. No, I don't.
Q. "Localized controls" is the next item here.
A. Uh-huh.
Q. And it states under "Localized controls," "Primary" and "Secondary." And for both of those you entered "No" or you selected "No localized controls."
A. Uh-huh.
Q. What is that referring to?
A. Well, the main control they're -- they're identifying there is ventilation or isolation. And so if there were, for example, a space where he, you know, cleaned parts in -- in a ventilated hood or in a -- like, a lab hood or a glove box or something like that, that would be, you know,

considered a -- a primary control.
Q. The next item here is "Ventilation rate."
Why did you select -- for the CRC model -- workrooms having "Only good natural ventilation"?
A. Well, the choices, you know, would be if you had a particular air exchange rate that, you know, had been calculated or you knew there was a certain air volume being exhausted from a room and you knew the volume of the room, you could, you know, improve this and come up with a more quantitative estimate.
But not having that information, you know, my default position to try to be conservative about it is, just say, Well, you know, I don't have any reason to think that there wasn't good natural ventilation in these -- in these spaces.
Q. What were the other choices you could have selected?
A. You know, I'd have to go back. I -- sitting here, I'm not sure I actually remember what all the choices were.
Q. Do you know what only good ventilation means in terms of ACHs?
A. I don't. I don't know what that -- you know what, that defaults to.

Q. Would it be appropriate to select "Only good natural ventilation" when a product is used in building that had mechanical and perhaps specialized sources of room ventilation?
MR. DuPONT: Form.
A. Well, it would, I think, depend on the -- you know, where that -- where that specialized ventilation was focused. I mean, kind of, by its nature, you know, specialized ventilation system wouldn't necessarily have much effect on the -- the general ventilation, you know, throughout the rest of the building.
(Discussion off the record.)
Q. I'm sorry. You do not know what the ACH value is that -- withdraw that.
You don't know what only good ventilation means in terms of ACH value; is that correct?
A. Yeah, I don't know really what number the model drops in. It's -- you know, I'm guessing it's a range of values, and they -- you know, they -- they may partition it off kind of like they do around the room size thing where they have, you know, two to three different values that they apply, and they apportion, you know, 20 percent to this, 30 percent to that, and -- and do the

calculation that way.
Q. What -- what would the selection be if the ACH was higher than, you know, you thought it was at the time you made the selection of only good ventilation?
A. Are you asking, like, what would the effect be on the --
Q. No, what -- what would it be called? What would the selection be called?
A. Oh, well, you could have, you know, very good, you know, mechanical ventilation, forced ventilation. Something like that.
Q. Okay. Has any study compared results from the ART model to real-world measurements based on a controlled simulation study?
A. Well, yeah. In fact, that paper that -- that I was a coauthor on where we looked at the ART model with the parts washers we did that.
Q. Which paper is that?
A. Oh, it's the one -- the first author is LeBlanc.
Q. That's not part of Exhibit 5; correct?
A. No. No.
Q. Okay.
A. That's actually been in play before.

Q. Okay. And any other study that you can cite to, other than LeBlanc?
A. Well, actually, you know, that's kind of what, you know, these three papers that I just threw into play today, you know, what they did was compare ART predictions with measurements of exposure. So that's really what all three of those papers address.
Q. What -- what is a physical mass-balance model?
A. Well, it's -- that's, kind of, a form of a -- of a mechanistic model where, you know, your inputs are the physicochemical characteristics of the material that's being used and the -- the temperature and the size of the room and the air exchange rate. You know, so it -- it relies on physicochemical properties to calculate a prediction.
Q. Are -- are physical mass-balance models generally considered stronger tools for case-specific exposure assessments, as opposed to the ART model?
A. Well, there is one article -- and I forget the name of the author who -- who made that point. Interestingly, though, he was mainly talking about

dust exposures.
Q. Uh-huh.
A. But that is, you know, one of the critiques, I guess I'd call it, that's been made in, you know, people's discussion of the ART model.
Q. Do you -- do you agree that physical-mass-based models are stronger tools for case-specific exposure assessments than the ART model?
MR. DuPONT: Form.
A. Not in general. I mean, I think, you know, specifically I -- I'm recalling the paper you're referring to. His point there really was around aerosols and particles, not around vapors.
Q. Do you agree that the Near Field -- is Near Field/Far Field a physical mass-balanced model -- physical mass-balanced model?
A. It's of that type, yeah. It relies on the physicochemical properties of the materials.
Q. Do you agree that the Near Field/Far Field is generally considered a strong tool for case-specific exposure assessments than --
A. I'm sorry. Could you repeat that. I missed part of that.
Q. Sure.

Do you agree that the Near Field/Far Field model is generally considered a stronger tool for case-specific exposure assessments than the ART model?
MR. DuPONT: Form.
A. I actually wouldn't agree with that, and -- and, you know, there haven't been a lot of direct comparisons, but the one that I, you know, would refer to is that paper LeBlanc did -- my student did. And, as it turned out, the predictions of the ART model were actually closer to the measurements of exposure than the predictions from the two-zone model.
MR. FISHKIN: Thank you very much. I'm going to -- I'm going to turn it over to my colleagues. I may have some other questions if I missed anything, but thank you for your time. Appreciate it.
MR. DuPONT: Let's take a break.
(Whereupon the deposition recessed at 12:22 p.m.)

AFTERNOON SESSION (12:58 PM)

EXAMINATION

BY MR. CAIRONE:

Q. Good afternoon, Doctor Herrick.

A. Hi.

Q. My name's Matt Cairone. I'll be asking you questions next, and I hope to be brief, and I may be jumping around because I'm trying to fill in some gaps; okay?

A. Sure.

Q. Would you look at page 22 of your report, please.

Let me know when you're there.

A. Yup. I'm here.

Q. So the last sentence of the second full paragraph -- I just want to make -- make sure I understand what you did. You assumed that Liquid Wrench contained raffinate until January of 1979; correct?

A. Yeah, end of -- yeah, right. End of '78, December of '78/January of '79; right.

Q. And that's based on an assumption that there was no recall the product, so you assumed it contained raffinate after the last sale by US Steel of raffinate to radiator [verbatim] in April of 78;

is that right?

A. Yeah, that's what I was trying to approximate that there was a certain amount of it that was already out there in the supply chain, and it wound up being used, and -- and so my cut off then was January '79.

Q. If that assumption is not correct, you've overestimated the time in which Mr. Rhyne could have been exposed to raffinate-containing Liquid Wrench by about eight months; right?

A. Yeah, if it were a scenario where, you know, like, sort of, someone threw the switch, and, you know, it was all replaced, and he wasn't using it for that eight-month period, that would be true, yeah.

Q. And that would be 8 months out of a 2 1/2 year period; correct?

A. Yes. Right.

Q. Could you go to page 44 of your report, please.

A. Okay.

Q. So I just want to see if you can clarify something that I don't understand.

You calculate a cumulative benzene exposure for Liquid Wrench at 6.55 ppm-years, but

the range ends at 6.25 ppm-years.

A. Oh, you're right.

Q. Can you -- so how do you explain that?

A. I think it must be a typo of some kind. Let me take a look at Table 4 and see what I put in Table 4. (Witness reviews document.)

Yeah. I'm sorry. That -- the value that should be applied is the value that's in the table. So this is -- what I put in the conclusion is a typo.

Q. So which value from the table should be the range? What should the correct range be in your conclusions?

A. Sure. What I tried to say here would be -- let's just say for the 5 percent benzene the cumulative -- the midpoint of the cumulative would be 6.25, and the range should be 5.42 to 7.55, which is what is in -- is in the table.

That's for the 5 percent benzene.

Q. And if there are other conclusions on page 44 of your report which have similar issues -- for example, the Kutzit -- where the range is less than the cumulative benzene exposure, would the same explanation apply?

A. Oh, I'm sorry. Yeah, I see there's --

there's a couple of things that I just didn't catch when I was -- was proofing this.

So the Kutzit value --

A. Yeah, it would be the sum of the -- you know, the midpoint would be the sum of that column, cumulative midpoint exposure, and, then, the range would be the sum of the values in that range.

So I -- I'm sorry. I'll -- I can redo these calculations or -- well, I mean, the calculations are okay. It's just I -- I didn't carry over the data from the table into the conclusions correctly.

Q. And does that same explanation apply for the conclusion with respect to mineral spirits?

A. Let's see. Just off the top of my head -- I haven't done the -- I can't do the calculation -- just sitting here -- in my head that quickly, but that could be correct, 'cause that 4.41, you know, should be the sum of the one, two, three, four values that are there under "Safety-Kleen Mineral Spirits Part Washer" in that column, the midpoint column.

So I -- I can do that calculation, but I think that could be -- that value could be the number that I meant to carry over, yeah.

Q. Okay. And you proofed this report yourself; right?
A. Well, obviously not very well. I didn't -- I missed some of these typos.
But, yes, I did.
Q. So the assessment you did in this case was an exposure assessment; correct?
A. Correct.
Q. And you'll agree with me that there's a difference between exposure and dose.
A. Sure, yes.
Q. Exposure is the last measure in the external environment; right?
A. That's the way I've always thought of it, yeah.
Q. And it's not until a substance gets into somebody's biological system that they have a dose.
A. Yeah, that's -- I mean, the, sort of, the conventional definition of dose is that it's the biologically relevant component of exposure.
Q. Right. And there are steps in between exposure and dose.
A. Yes.
Q. What kind of steps are there?
A. Well, if you think about -- let's just --

since we're talking about benzene, if you inhale the benzene vapor, you know, there's benzene in the air that winds up in your respiratory system, and, then, there's a partitioning between the air and the circulating blood that's going through your lungs, for example. So, you know, there's -- a trans-- a translational, sort of, process getting from the air into the biological media, and then, once it's in the blood, it's metabolized by various pathways in different ways throughout the body. So you have, sort of, this continuum of the relationship between what's outside the body as the exposure, and what winds up actually getting to some site -- either at the molecular level or the cellular level -- where it can have some sort of an effect.
Q. Right. So exposure can't create a toxic response without a dose; right?
MR. DuPONT: Form.
A. Well, sure. It's -- you know, it's part of the pathway, I guess, is the way I've always thought of it.
Q. When you say, "sure," are you agreeing with what I said?
MR. DuPONT: Form.

A. Sure, it's part of that pathway that you characterized, yeah.
MR. DuPONT: Form and scope.
Q. Doctor Herrick, do you agree that under OSHA, the duty of an employer is to provide a safe and healthful workplace for its employees?
MR. DuPONT: Scope.
A. Yeah. In very general terms, that's language that's right out of the OSHA Act.
Q. Okay. What's your understanding of what a flammable substance is?
A. Well, it would be, you know, kind of, a -- my -- my operational definition of it would be a material that -- that's capable of burning in air.
Q. And is there a general cutoff for a flammable liquid in terms of flash point?
A. Yeah, they're kind of related. I mean, and, you know, what you have for -- for a flammable liquid would be, sort of, a range of air concentrations, and at the lower end of that would be what they call the "lower flammable limit," and at the higher end would be the "upper flammable limit."
Q. Do you have an understanding of what a flammable liquid flash point is to -- to make it a

flammable liquid?
In other words, is there a flash point at which a liquid is considered flammable in terms of workplace safety?
MR. DuPONT: Form.
A. Yeah. I mean, actually, I think the more useful concept is -- is, you know, the upper and lower flammable limit, 'cause that's what -- if you're trying to assess the risk that there could be, you know, an explosion or a fire, that's the quantity that people measure. You know, that's -- that's the -- the airborne concentration that dictates whether there's enough of a material present in the vapor phase to actually explode or catch fire.
Q. Okay. What is your definition of flash point?
A. Yeah, that's why I'm struggling with it a little bit. I think that's -- you know, I haven't really used it that much, to tell you the truth, 'cause you don't -- if you're -- if you're trying to assess the risk of a fire or -- or explosion, you tend to use the upper and lower flammable limit more as your -- as your metric than -- than the actual flash point.

Q. Okay. So let's -- let's talk about the lowest temperature at which a combustible liquid gives off enough vapor to cause a fire.
Is that what you're talking about in terms of the lower level?
MR. DuPONT: Object.
A. Okay. Yeah. Actually, the lower level, you know, what I'm referring to is the concentration in air. It's not really the temperature of the liquid, per se.
Q. Okay. Do you know what the flash point of raffinate is?
A. The flash point? I don't, off the top of my head.
Q. Now, you -- you've read Mr. Rhyne's deposition testimony; correct?
A. I did.
Q. And so you understand how he was using Liquid Wrench, according to his testimony, in the pipe fab shop at McGuire; right?
A. I do remember that, yeah.
Q. How was he using it?
A. Well, there were a couple of different ways, and he mentioned it, and, then, the other gentleman whose name I'm blanking on who was

deposed, you know, talked about it in a similar process. And as I recall, they -- they were using it in a couple of different ways: One is when they were doing this honing process, which is, kind of, a low-speed, lathing-type process, as I recall it. It's a -- puts a bevel on the end of -- of pipe.
And so they were using the Liquid Wrench as a lubricant and a coolant on this little sharp bit that actually does the honing, you know, that -- that creates the bevel at the end of the piece of metal.
And, then, the other application was when they were using one of the saws to cut through the metal parts, they used the Liquid Wrench again as a lubricant and a coolant during that cutting process.
Q. And do you have any understanding as to whether Liquid Wrench is intended to be used as a coolant?
A. I -- I don't. I mean, they were -- they were using it -- I remember that that was their testimony that they used it that way, but, you know, I -- I don't really have a comprehensive, you know, sort of grasp of all the intended uses for Liquid Wrench.

Q. Do you have any understanding as to what the product Rapid Tap is designed for?
A. Only in a limited sense. I mean, just -- especially given the way it's titled. You know, my sense would be that if you were putting -- say in a piece of metal -- if you were drilling it and then putting in threads that a bolt would be installed in, you know, that -- that's my understanding of what's usually called a tapping process, is creating that threaded hole.
Q. Okay. Do you have any understanding as to what the product Tap Magic is intended for -- in terms of use?
A. Only in the most general sense.
I mean, I -- I sort of infer from the way it's titled that it's a similar application.
Q. Do you have any understanding as to what a cutting oil is?
A. Well, that I'm closer to, 'cause, you know, I've studied metal machining, you know, in a lot of situations. And, yeah, I do have a working knowledge of what "cutting oil" refers to.
Q. Okay. And what are cutting oils used for?
A. Well, they're more in -- in metal machining -- to cool parts, to lubricate parts, and

to remove the excess metal that's been produced from the machining process.
Q. So based on the testimony that you read from Mr. Rhyne -- and I think you're referring to Mr. Couch as the other person?
A. Couch, yeah. Thanks.
Q. In terms of what they were doing in the pipe fab shop, would it make sense to you if they were using a cutting oil?
MR. DuPONT: Objection. Form.
A. Well, not having, you know, really seen what they were doing in action, you know, I -- my impression is that that's what they were using Liquid Wrench for: as a substitute for a cutting oil.
Q. And do you have any opinion as to whether that's an appropriate use of Liquid Wrench?
A. I really don't. It -- you know, what I don't recall is, you know, from his deposition or any of the questions, you know, if he was actually asked, you know, Why did you do that? Or, Where did you guys get the idea that that's, you know, the practice that you should be following? I don't remember that coming up.
Q. If I ask you to assume that the lowest

temperature at which raffinate can ignite in the presence of an ignition source in oxygen is 25 degrees Fahrenheit, would that change your view of whether that was an appropriate use of Liquid Wrench?

MR. DuPONT: Objection to form.

A. Well, what's really in play here isn't so much the -- the flash point as the lower flammable limit. You know, that would be the amount of vapor that you would need to have in order for there to be a flash or to be a fire of any kind. And -- and I did try to look that up. And so for benzene the lower flammable limit is -- is 1.2 percent. And that's the same as 12,000 parts per million.

So they would have to have reached that concentration in order for the lower flammable limit to be exceeded so you could have had ignition.

Q. But isn't that based on the assumption that the flammability of raffinate was solely due to the benzene content?

A. Well, that's a good point. That -- that's the -- that's the lower flammable limit for benzene, right.

Q. Right. But I'm asking to you assume the

lower -- lower flammable limit for raffinate is 25 degrees Fahrenheit. I know you want to talk about it in different terms -- but let me ask a different question.

A. Sure.

Q. I'll withdraw that.

Do you know what's in raffinate besides the benzene?

A. You know, I remember reading -- and off the top of my head I'm not really sure I could give you a real good, you know, sort of, list of ingredients.

Q. Do you know any of the other ingredients?

A. I'm guessing there's other hydrocarbons -- I mean, just given the source, you know, of the raffinate to begin with. And isn't it, sort of, like a -- it was described as kind of a milky, emulsion-type product -- kind of had a creamier, milky appearance to it.

Q. What's the source of that description of raffinate?

A. I'm just trying to remember from -- from some of the documents I reviewed that talked about, you know, kind of, the -- the role of -- of raffinate as a source of benzene or Liquid Wrench.

Q. What is the source of raffinate?

A. Well, it, I think, is from the -- from the coking process, from the -- the processing of coal into coke.

Q. Can you be more specific?

A. I don't remember exactly where, you know, in the process stream it would have come from.

Q. Let me ask a more general question: Do you think it is appropriate to use a flammable liquid to cool hot machinery?

MR. DuPONT: Objection. Form.

A. Well, I would say it's -- it's not -- it wouldn't be the first choice, especially from a, you know, perspective of somebody -- if -- if you were, you know, asked for an assessment or an opinion as a health and safety person, is that, you know, what you would recommend, I don't think anybody would make that their first choice.

Q. And that's exactly what I'm asking you as an expert in the field. It wouldn't be your first choice, would it?

A. No.

MR. DuPONT: Objection to form.

Q. An appropriate choice would be a cutting oil; right?

MR. DuPONT: Objection. Form.

A. Well, you know, I think, you know, given the way they describe the process, you know, the nature of these beveling and sawing processes, you know, that there would have been other materials that would have been, you know, a better choice for that application.

Q. And earlier you talked about the Approved Chemical List.

Do you remember that?

A. I do.

Q. Is Liquid Wrench on that list?

A. Good question.

I can -- I mean, I've got it right here. Should I take a look?

Q. If you would like. I mean, I can tell you that I couldn't find it on there, but I'm not asking you to take my word for it.

A. Okay. Well, I -- I mean, if you -- you've obviously looked more recently than I have, so --

Q. So rather -- it is what it is. So let's assume it is not on there --

A. Okay.

Q. -- and if it is, then I'm -- then I'm proven wrong.

Rapid Tap is on there, right, 'cause you mention that in your report?
A. I'll take -- take your word on that, sure.
Q. And Tap Magic is on the Approved Chemical List.
A. Right.
Q. So those are two cutting oils that would have been more appropriate to use in the pipe fab shop; correct?
MR. DuPONT: Well, that's making an assumption.
A. You know, not really having, you know, intimate knowledge of -- of how -- how and why they were doing it or -- you know, I think those -- those materials could have been useful for that application, sure.
Q. Okay.
MR. CAIRONE: Can I mark...
(Exhibit Herrick 6, page 39 of John Spencer Summary Report.)
Q. Doctor Herrick, I've marked Exhibit 6 -- it is page 39 from John Spencer's report in this case, which I think you indicated you have read; correct?
A. I have, yeah.

Q. So there's a paragraph where he evaluates your evaluation of benzene exposure to Liquid Wrench.
Do you see that? There's a title, "Doctor Herrick's Evaluation of Benzene Exposure to Liquid Wrench"?
A. I do see that, yeah.
Q. Could you read the last -- you can read the whole paragraph if you'd like, but I'm focused on the last three sentences, and I'd like to get your reaction to that.
A. "As noted on the Liquid Wrench label, the Flammable Mixture Do Not Use Near Fire Or Flame. Application of this product to a hot metal surface may cause a fire. Consequently, it is unlikely that Mr. Rhyne used Liquid Wrench as described in any exposure assessment based on this practice is neither relevant nor reliable."
Q. Do you have a reaction to that?
A. Well, I mean, I have read this, and I -- I see, you know, Spencer's comment. I guess my -- my reaction is, I don't have any reason to question what Rhyne and -- what's his name, Couch?
Q. (Nods.)
A. -- you know, gave in their -- you know, I

mean, they were under oath. They gave this as their -- as their testimony. And, you know, I'm not trying to speculate as to why they would have said it if it -- if it wasn't what they actually did.
Q. Any other reaction to that?
A. To what they said or to what Spencer said?
Q. To -- to Mr. Spencer's comment in the report.
MR. DuPONT: Compound.
A. Well, let me just say, I mean, just, you know, in general, you know -- and I've done a lot of these retrospective exposure assessments; you know, one thing I've -- I've concluded over the years is that, you know, people are -- are pretty good at telling you what they did. And that -- you know, just taking occupational histories on people, they -- they tend to remember information like this.
They may not have a good recollection of how big the room was, or, you know, some of the other details, but if you ask people, you know, What did you do, and how did you do it, they're -- they're usually pretty good.
Q. Do you recall when you reviewed Mr.

Rhyne's deposition that he said that the metal he was cooling was too hot for him to touch with his bare hands?
A. Well, I remember this came up, you know, sort of, in -- in some of the conversation about wearing gloves and -- and so forth and whether he was getting any -- anything on his skin, and, yeah, I do remember him saying that the metal did get hot.
Q. And do you have any opinion on what the temperature of metal has to be before it is painful to the human touch?
A. Ooh. That's a good question.
I guess I really don't. I mean, it probably -- I mean, I guess -- I imagine there's a lot of variability between people, but I -- I wouldn't feel comfortable trying to put a number to it.
Q. Okay. Fair enough.
I've read some things that suggest it's above 100 degrees Fahrenheit. If -- if you agree with that or not, you can just let me know.
A. Let's see. 100 degrees Fahrenheit. I'm just trying to think of -- you know, if you open your car door on a hot, sunny day. I imagine if

it's -- if it's 100 degrees, it would, you know, you would definitely, you know, feel, you know, possibly there's an uncomfortable sensation on your skin, yeah.

Q. And I think you testified earlier that you read all four volumes of Mr. Rhyne's deposition.

A. I did.

Q. What is your process for determining what information you need to develop your opinion in a case like this?

A. Well, it's -- it takes a long time, I can -- I can definitely testify to that.

I mean, my -- my process in -- in trying to do these assessments and -- and develop this report is to use the -- the work history as, sort of, the foundational document. And so, you know -- and that's, you know, derived primarily from the deposition.

In a case like this, you know -- excuse me -- there were, you know, lots of rounds of questioning. And so what I tried to do was, you know, synthesize, you know, the answers -- you know, the responses that he gave, you know, to different people, based on, you know, the way he described the working conditions and the -- the

nature of what he, you know, actually did specifically with regard to the -- to the materials that he was handling, to the chemicals that he was using.

So in building this all together, the work history really then, as I say, kind of provides as a framework for trying to develop ways of -- of estimating what the levels of exposure were.

Q. Other than the deposition testimony where -- from which you derive work histories, do you ask for any other information or documents in order to formulate your opinions in a case like this?

MR. DuPONT: Objection. Form.

A. Well, the information about the -- the products, for example. In other cases where I've had, like, detailed reports about industrial hygiene measurements, for example, that people made, you know, that kind of helped shed light on the -- the levels of the exposures that people had.

You know, there are times when I'll get information about their hazard communication programs, information about the training that people have, respirator programs. Things like that.

Q. Did you ask for any of that in this case?

A. No, I didn't, so --

Q. Why not?

A. Well, that's a good question. I mean, it could have been useful. I mean, I had the impression that they didn't really have, you know, a lot of air sampling and industrial hygiene measurements, for example. And that didn't surprise me, you know, partly because a lot of what he was doing was construction and maintenance activities; and over the years, you know, it's been my experience that there's -- there's -- it's, sort of, rare, actually, that a lot of exposure measurements are taken during those phases.

Q. Well, aside from air measurements, did you ask for any documentation in terms of what Duke Energy required with respect to personal protective equipment?

MR. DuPONT: Form.

A. I didn't ask for more. There was some information, you know, in his depositions about the use of gloves and, you know, things like that. So there was some of that.

Q. More generally, do you ask for information, or do you just assess what you're given?

A. Well, in a case like this, you know, given, you know, kind of, what the -- what my charge was, you know, which was to -- to do the exposure assessment and not to try to, you know, get into the particulars about any of his programs or any of the protective equipment that he was using, I didn't go further looking for more information, no.

Q. Okay. Did you ask for any information in addition to that which you received in terms of his potential exposure to radiation at Duke Energy?

A. Well, no. I had those, you know, summary sheets of his dosimetry, and, you know, I did look at those. And I remember reading from his deposition about an episode when he felt there -- you know, there had been radiation exposure, and there was a followup investigation that was conducted by the Duke health physics staff, I suppose.

So beyond what was in that exhibit, I didn't dig for anything more.

Q. Any reason why you didn't ask for anything more?

A. Well, I looked it over, and, as I recall, you know, he had -- I think they were quarterly

results. There was -- there was the summary in those sheets they had monitoring from, you know, his period of employment. And with the exception of those couple of samples that I -- that I commented on in the report, all of his other measurements came back a zero or nondetected.

Q. And when Mr. Fishkin was asking you questions earlier about some assumptions you made about the size of the work -- workspace and work areas -- do you recall those questions?

A. Sure.

Q. Do you know whether, for example, the pipe fab shop where Mr. Rhyne says he was exposed to Liquid Wrench at McGuire in the late '70s, do you know if that facility still exists?

A. Good question. I -- I don't know. Given what they were doing in there, I -- I think I'd be a little surprised if it was still there in the same configuration and -- and size as it was, 'cause, you know, that was part of the construction process; and, you know, once the facility was finished, I don't imagine that they needed to do that much more fabrication.

Q. Did you ask whether it was still in existence?

A. No.

Q. Why not?

A. Well, I -- I didn't really find that I -- that I needed that additional information, given what was already in the record.

Q. But a visit to a facility that still exists would be a better gauge of its dimensions than someone's recollection from 40 years ago. Would you agree with that?

MR. DuPONT: Objection to form.

A. If -- unless there had been some, you know, change --

Q. Assuming the same -- assuming it was the same.

A. Well, sure. I mean, if you can visit something and see it firsthand yourself, as opposed to relying on, you know, recollections of people from 40 years ago, sure.

Q. And up until the time you prepared your report, which you have in front of you -- I think you may have been asked this, and I apologize, but I just want to make sure I understand -- how much time did you spend on this case?

A. I'm sorry -- make sure I understand the question.

Q. Through the preparation of the report --

A. Of the entire --

Q. Up and through -- yeah.

A. Oh, wall to wall, from beginning to --

Q. Until you signed the report.

MR. DuPONT: Asked and answered.

A. You know, I know it's in -- it's in the records -- it's in the records, you know, from EH&E about -- 'cause my hours are billed by project. You know, it easily could have been a couple of hundred hours.

MR. CAIRONE: Look through my notes really quickly, and then I'll be done. (Reviews documents.)

Q. Do you recall from the deposition testimony of Mr. Couch and Mr. Rhyne how many beveling machines were in the pipe fab shop?

A. Off the top of my head, I don't. And I -- you know, I don't really -- I'm just trying to think if I included that in the report or not. I don't think I have it in the report, so I -- I don't know.

Q. Do you recall from that testimony how many large saws were in the pipe fab shop?

A. I don't right offhand, and I -- I don't

recall that I have that in the report.

Q. Do you recall from the testimony of Mr. Rhyne and Mr. Couch what they said they used the Liquid Wrench for in terms of a cooling oil?

MR. DuPONT: Objection. Asked and answered.

Q. On which equipment? -- let me put it that way.

A. Oh, okay. Well, the -- and for the two guys, what they describe was using it on this beveling machine. They -- they definitely recalled using it there. And I just want to see what -- 'cause I know he used, you know, a couple of different types of saw, and I'm just trying to see if I put in here which of the saws they actually used it on. (Witness reviews document.) 'Cause they had -- one saw they, kind of, referred to as a one-armed bandit, I think, and my impression from that is that's, kind of, like a Sawzall -- kind of like a chop saw. And, then, some of the other saws were more like, sort of, a fixed band saw that was in a single stationary spot. And, you know, just sitting here right

now, I don't remember how many of those that they said were actually in the -- in the pipe shop.
Q. Do you recall whether they said they used Liquid Wrench on that bandit saw?
A. That's -- bandit saw. Sorry. That's what it was. I think that's where they used it. I could go back -- I'm quite sure they mentioned that somewhere in the deposition. I'm not -- I don't have it in my mind right at this moment. It was on one of the saws.
Q. And if I ask you to assume that the testimony is that there was one beveling machine and one large saw, and that the only thing they used Liquid Wrench on was that one beveling machine and that one large saw, that would impact on how often an individual employee could be performing that work; correct?
A. Yeah, and I just was -- I think I put it in here what the duration -- you know, how long they actually used the different tools each day.
I'm just looking for my -- through my notes here. (Witness reviews document.) Yeah, both Mr. Rhyne and Mr. Couch recalled doing the beveling process on an average of at least an hour a day. And that's -- that's what I had from the

deposition.
Q. Okay. And you are not offering any opinions in this case on warnings; correct?
A. No.
Q. Okay.
MR. CAIRONE: Thank you, Doctor Herrick.
THE WITNESS: Okay. Thanks.
MR. SCHULTZ: Can we go off the record for just a minute.
EXAMINATION
BY MR. SCHULTZ:
Q. Doctor Herrick, my name is Vaughn Schultz. We've not previously met. Nice to meet you.
A. Nice to meet you.
Q. While we were off the record there for a short break you handed me some additional materials that we have marked as exhibits. It looks like -- I've marked Exhibit 7 as your handwritten notes for this case?
(Exhibit Herrick 7, five-page document, handwritten notes.)
A. Right.
Q. Okay. You can hand that back to me.
A. Sure.
Q. And, then, you handed me another article

you wanted to make a part of your deposition, Exhibit 9. Looks like van der Wal from 1984?
(Exhibit Herrick 9, Article: "The Performance of Passive Diffusion Monitors For Organic Vapours for Personal Sampling Of Painters.")
A. Right.
Q. And then you've also -- took it out of order -- but you gave us some Excel spreadsheet printouts that we marked as Exhibit 8, and these spreadsheet printouts are the results of the ART model?
(Exhibit Herrick 8, five-page document, spreadsheet.)
A. And -- and the other estimations as well. So those are -- that's the calculation to get to the cumulative exposure.
Q. Okay.
A. Yeah.
Q. Were these spreadsheet values taken from the ART model?
A. Some of them were, yeah. Yeah. But, you know, as you recall, in some cases I used model results from the two-zone model --
Q. Okay.

A. -- in a couple of these situations, and then there were others where I used the data from other sources.
Q. And for those calculations you just inputted your results into this spreadsheet.
A. That's right, yeah.
Q. Okay. I'm just going to pass this to other counsel if they want to look at your notes.
A. Okay.
Q. You're not a chemical engineer; correct?
A. No. No, I'm a chemist.
Q. You never worked in a refinery?
A. Well, I did -- I wasn't an employee of a refinery. One of the things I was able to do in my NIOSH days, though, was spend a lot of time in refineries, because we were doing a study of polycyclic hydrocarbon emissions from refineries.
Q. Where was that at?
A. Well, turned out I was all over the place. I was all over California, Texas, Oklahoma, Great Falls, Montana.
Q. And you were measuring -- what did you say -- polycyclic hydrocarbons?
A. Yeah, the heavy organic PAHs that were emitted from the refinery.

Q. What years was that?
A. That was in my, kind of, early NIOSH days. That would have been in the late '70s.
Q. Were those results ever published?
A. Well, they were published in NIOSH reports, yeah.
Q. Do you recall the names or numbers or anything like that?
A. I could get it for you. It's, you know --
Q. Is it on your CV?
A. You know, I did -- I don't think it's on the CV, because I didn't -- you know, they weren't peer-reviewed in the sense that they were in a journal. They were published as -- with the NIOSH publication number.
Q. Okay. Would your name have been on the author list?
A. Well, you know, the way they cited those government reports, they didn't really identify, you know, the author. They -- they had the name of the agency and -- and the report number. But you'd have -- I mean, I'm sure my name is in there, but you'd have to, you know, you'd have to dig down into the -- into the text.
Q. Okay. So your work, though, at those

refineries was limited to measuring air sampling?
A. Yeah, that's what we were doing. We would spend about a week at each one and -- and do a pretty extensive walk-through of the facility, and then identify sites where we took personal samples on the guys who were doing the refining jobs.
Q. You have not actually worked on the distillation of crude oil yourself, though; is that correct?
A. Not as a refinery employee or a...
Q. Your -- your CV noted that you worked on a scientific advisory panel for Exxon from '91 to '95. And I understand you've testified a little -- a bit about that in the past, but I wanted to ask: Who hired you for that role that you had?
A. Well, this is the -- the "Exxon Shanghai Study," as people refer to it, and what they put together was an advisory panel -- external advisory panel, and the guy who was the chair of it was this guy named Gerry Rice, who had been an epidemiologist at the National Cancer Institute, and I knew him from some work I had done with NCI; and he invited me to participate on the exposure site.
Q. How many people were on the panel?

A. Yeah, gee, I think it was about -- I'm going to say between eight and 10.
Q. Were you paid for that work?
A. I was.
Q. By the NCI?
A. No. See, by this time Rice was retired from NCI. So this actually wasn't really a government-related study at all. I think probably Exxon paid me.
Q. Do you recall getting checks that said "Exxon" on it?
A. It's been a while. You know, I honestly -- and it may have even been direct deposit for all I know, but, you know, the way the study was conducted is they had a University of Colorado scientist who was, sort of, the -- the primary investigator, and, then, they also had people working on the project who were Exxon employees.
And so our role was -- but, then, Exxon basically paid -- you know, paid for the cost of all that research.
Q. That's what I want to know.
What was your role as a member of the panel?
A. Yeah. Well, they -- they asked us to be,

kind of, the outside advisors around the issues of the study design, and then, you know, as they were doing these surveys in China and collecting information, I was working on, you know, the -- looking at the information that -- that came in from the exposure side.
Because they had all kinds of collaborators in China, including these people who were, you know, kind of, like the local health department-type guys who were trained to collect air samples. And so they went out into these different factories in China and did air sampling.
In some cases there was historical data, a little bit of old data that the factories had. They collected all that. And the task that was at hand was to take that information and synthesize it together so they could use that exposure as part of this epidemiologic study that they were doing.
Q. When you said, "they asked you," did you mean the scientists that were -- were involved from the universities?
A. Yeah, the scientists, and, then, also the -- the scientists from Exxon, because it was -- they were, kind of, doing it hand-in-hand; and so they had, like, the two Exxon guys; and the one

guy's name was Rob Schneider the other is Tom Armstrong. You know, they were, sort of, our connections with the company, and, then, they were -- they were working directly with the people at the university.

But the university people were a little more focused on the genotoxic side. You know, they were looking at cellular -- you know, DNA changes, basically cellular changes.

So it was, kind of, a hybrid design of the study, I suppose you could call it, in that you had university investigators, and, then, you also had Exxon's scientists working on it as well.

Q. Did you provide comments on drafts of papers that were published out of that study?

A. We -- yeah, I mean, my stuff was, you know, really focused more on the exposure side. So I didn't review the -- you know, the EPI reports and that kind of stuff, but I think what we wound up doing was, we tended -- this advisory group tended to review and advise on the reports that were produced, and then the -- the researchers from the university and the company used that as the basis for their manuscripts.

Q. Okay. Earlier Mr. Fishkin was asking you

about exposure to benzene in the ambient air that all of us are experiencing.

Have you ever seen any literature about the dose that that would accumulate to over the course of a person's lifetime?

MR. DuPONT: Objection. Form.

A. I have seen some. I don't remember -- you know, I don't have a particular recollection of what the levels would be. I mean, I do remember that, you know, just the ambient levels tend to be highly variable, depending on whether you're living in an urban setting or a rural setting or downwind of a -- of a -- you know, major refinery or something.

Q. I want to ask you about primarily the exposure calculation you did in Table 4 --

A. Okay.

Q. -- for mineral spirits cleaning, where you reached a cumulative midpoint of 2.8 parts per million years.

A. Yeah. Okay.

Q. The product that you are assuming that was used for that mineral spirits cleaning, what exactly was that product?

A. Yeah, let me look, because that was when

we're -- you know, that was information that was in the deposition. And let's see...

And this was when he was on the pipefitting crew, and -- this is Mr. Rhyne -- you know, in his deposition he said he would go to the painters to get what he called Varsol. So that was the term that he used.

Q. Do you understand "Varsol" and "mineral spirits" to be used interchangeably?

A. Well, my recollection was that Varsol is really the trade name, right, for the product that -- that Exxon produces. And, you know, I've always considered it, you know, to be in that broad family of what we call mineral spirits, yeah.

Q. Are you aware of people using the word "Varsol" colloquially as they would "Kleenex" or "Xerox" to refer to a generic product?

MR. DuPONT: Form.

A. Yeah, I think that -- that does sound familiar. I mean, I think, you know, it's a -- a common product, and it's the kind of thing that people, you know, may well have, you know, attached that name, without necessarily even knowing that it was, you know, unique to a particular company.

Q. On page 27 of your report you note that

Exxon Varsol No. 18 appears on the Approved Chemical List that we've discussed today?

A. Uh-huh -- yes.

Q. You can agree with me that that Approved Chemical List is 11 years after Mr. Rhyne testified that he used Varsol in '80-'81?

A. Sure, 'cause didn't we establish the list was from '92; is that --

Q. That's correct.

You would agree that there's no testimony that he used Varsol in 1992; correct?

A. I don't think he was -- he wasn't doing this job in '92, no.

Q. You have not seen any Approved Chemical List from any other year?

A. No, I only have the one.

Q. Did you assume that because Varsol 18 was on the list of products in '92 that he was using Varsol 18 in 1980-81?

MR. DuPONT: Objection. Form.

A. Well, you know, in terms of the way I tried to estimate his exposure, you know, which I used the ART model for, you know, it didn't really require that I assumed that it was Varsol 18 or any other one.

What I did was I, you know, I calculated his exposure, saying, Well, okay, what would it be if the mineral spirits contained 50 parts per million, or how much would it be if it was 500, and what would it be if it was a thousand.

Q. Do you understand that ExxonMobil is being sued for Varsol in this case?

A. Sure, I guess. I mean, I -- I don't know exactly why they're -- why anybody is being sued, but...

Q. Do you have any evidence that the Varsol he used in 1980-81 was ExxonMobil Varsol?

MR. DuPONT: Objection to form.

A. There was nothing in the record that, you know, other than him testifying that he went to the painters and got Varsol, but that's pretty much the extent of the information.

Q. He did not testify that the Varsol he used was ExxonMobil's, was it, correct?

A. You know, I don't think that ever -- no one ever asked him that, and I don't think it came up in his deposition, no.

Q. Do you know how many different types of Varsol are manufactured by ExxonMobil?

A. Wow. No, I don't.

Q. Are you aware that there are multiple versions at different points in time?

A. That wouldn't surprise me at all, yeah.

Q. Do you know the benzene content of those different types?

MR. DuPONT: Objection. Form.

A. Well, I've tried to read -- you know, and there's been a lot of publication about that obviously, about the different benzene content of different, you know, grades and products as they've changed over time and by geography. And, you know, so I've read the summary articles, you know, that Williams prepared, and, then, there's Kopstein's article and some other reviews.

So, I mean, I -- I have tried to, you know, get a working familiarity with that, yeah.

Q. What about for the time period of 1980 to '81?

A. I don't have a particular number in hand. You know, I mean, there's -- there's some data in that Williams report in her supplementary tables of what benzene content was in mineral spirits in -- in 1980. I don't think she identifies it specifically as being Varsol.

Q. Did you conduct any search in the

published literature for the benzene content of ExxonMobil's Varsol?

A. No, I didn't.

Q. Do you know if any such data exists in the published literature?

A. That's unique to Exxon's Varsol?

Q. Yes.

A. I don't know that.

Q. You note on page 25 of your report that there is no indication that mineral spirits Mr. Rhyne used were formulated in accordance with Rule 66, which applied to California and not North Carolina, where he was employed.

Do you see that on page 25?

A. I do see that, yeah. Yeah.

Q. Do you know when Rule 66 went into effect?

A. Oh, good question. No, I don't.

Q. Do you know whether Varsol 18 was a Rule 66 solvent?

A. I don't know that.

Q. If Varsol 18 is a Rule 66 solvent, how would that have changed your analysis?

A. It really wouldn't have, because I didn't have any reason to think that Mr. Rhyne used Rule 66 mineral spirits in North Carolina.

Q. My question was if Varsol 18 was a Rule 66 solvent and you are assuming that he used Varsol 18, how would that have changed your analysis --

A. Oh, sorry.

Q. -- if it was a Rule 66 solvent?

A. I see. Gotcha.

MR. DuPONT: Objection. Form.

A. Well, I think I would have, you know, considered that the -- the benzene content, you know, is closer to the low end of those three that I chose -- is closer to the 50 parts per million than it is to the thousand parts per million.

Q. Is your opinion that he was exposed to 2.8 parts per million years with mineral spirits cleaning in Table 4 directed exclusively to ExxonMobil?

A. Well, no, because he didn't -- there's really nothing in the record that would specify that the mineral spirits he got from the painters was from ExxonMobil.

Q. The ART model calculates exposures during events; correct? It does not calculate your cumulative numbers in Table 4?

A. Right. It -- it's scenario based. I mean, that's, kind of, what the authors

characterize it as, it -- characterizes exposure by scenario.
Q. If you look at Table 3, when you're talking about your daily average benzene exposures, is that a number that ART calculated for you, or did you calculate the TWAs yourself after ART gave you the task-based numbers?
A. The way I did this one -- and I can check the appendix -- is I -- I think his duration for using this was one hour. And so that was what I asked ART to give me was the one-hour average. And -- and so that's the output. And so, then, what I would take is the time-weighted average, assuming that the other seven hours were unexposed.
And so that's the -- that would be his daily average.
Q. So just -- just so we're clear, the .56 that you calculated for the mineral spirits cleaning, you basically took the ART value and divided it by eight.
MR. DuPONT: Objection. Form.
A. That's effectively what you do, yeah --
Q. Okay.
A. '-- cause the other seven -- seven hours are zero.

Q. And in Table 4, to get to the 2.8, how did you reach that number?
A. Well, that's -- what's in that spreadsheet I gave you was -- that's multiplying -- and I'm trying to think if I had...
(Witness reviews document.) Oh, see -- and also I -- well, never mind. That -- that had to do with the duration of time that he spent on the pipefitting crew.
Q. Okay.
A. So he had his daily average, and, then, that was his average each day times the years that he had that daily average.
Q. And you're saying that was five years?
A. I think that's right. Am I right about -- I can double-check.
MR. DuPONT: Don't guess. Take a look.
A. No, double-check.
Q. Well, .56 times 5 is how you get 2.8; correct?
A. That would be the -- the calculation, yeah.
Q. But wouldn't you agree with me -- and I think you write it on page 9 in your report -- that he only used Varsol for two years: '80 and '81.

MR. DuPONT: Compound.
A. Mr. Rhyne recalls using Varsol during the early '80s around '80 and '81 while working on pipefitting.
Q. That's only two years; correct?
A. '80 and '81, yeah. Yeah.
Q. So is this 2.8 that you've used five years incorrect?
A. Can I take a look at the -- the spreadsheet here? 'Cause I can see what I used for the -- for that multiplication. Let me just take a peek here.
(Witness reviews document.) So I did use five years for the mineral spirits. For cleaning with mineral spirits I used five for the calculation.
Q. Should you have used two?
A. Well, let me go back and check. It's possible. I mean, it may be that I had -- I can -- I'll double-check, but I -- it's possible.
Q. Well, are you aware of any evidence, as you sit here today, that he used Varsol outside of the '81-'81 time period?
A. Well, that's the part I need to go back and check to see, 'cause I -- I see where, you

know, I have that -- that reference to a page in his deposition, and I'd have to go back and -- and see if I carried that over correctly.
Q. If the evidence is that he only used it from '80 to '81, is the appropriate factor 2 instead of 5?
A. If he only used it for the two years, then, yeah, that would be his duration.
Q. And if you had calculated Table 4 using two years, would you agree that you would have reached the result of 1.12 part per million years as your cumulative exposure midpoint?
A. That would be the -- the way that would multiply, yeah.
Q. And these numbers are based on the 500 parts per million benzene content assumption; correct?
A. Let's see what I used for...
(Witness reviews document.) Yes, that is based on the five -- well, actually, you know, if you remember, on page 36 what I tried to do was adjust it for the fact that he changed the Varsol twice a week or once a week. I can't remember.
So on one day he was using fresh Varsol, and on the next day he was using day-old Varsol;

and so I adjusted it down to reflect that there had been, you know, benzene released in the first day of use. And so on the second day, the Varsol didn't contain, you know, the same amount as it had on the first day.

Q. Planned to ask you about that --

A. Okay.

Q. -- but my -- my question is, I guess: You're starting from 500-parts-per-million value to calculate the Table 3 and Table 4 figures; correct?

A. That's what we're starting with, and, then, as you're probably about to ask, you know, on the second, you know, for some of the days the value was -- was less than 500.

Q. So I want to walk through some of the assumptions that you made to reach this .56 cumulative -- I'm sorry -- "Daily Exposure Midpoint" on the -- derived from the ART model.

You would agree the higher benzene content you put in the model, the higher the output; correct?

A. That's right, yes.

Q. Did you use any ExxonMobil benzene content data in the ART model?

MR. DuPONT: Form.

A. In an indirect sense that, you know, I mean, there are lots of reports out there of -- of benzene content of -- of various mineral spirits and including Varsol; and so, you know, the way I came to this, you know, sort of range of 50 to 1,000 was to try to recognize that there really isn't a consensus around, you know, the amount of benzene that's present, you know, especially going back in time.

And so what I tried to do was to capture what I thought was, you know, the range, which would be 50 to 1,000, and, then, the midpoint of that range.

So that was, kind of, my logic in choosing those numbers.

Q. If ExxonMobil's Varsol contained closer to 50 parts per million or less of benzene, would the appropriate figure have been to use the lowest value in your range?

MR. DuPONT: Form.

A. Well, that's why I did the range, you know, so that you -- you know, we could take a look at the -- you know, the extreme values, as well as the -- the value in the middle.

Q. In the materials that we received this

morning immediately prior to your deposition that were your file materials in a Dropbox, I noted that you had a set of records of 57 pages of Varsol 1 testing data that had been previously produced to Mr. DuPont.

Did you review that data?

A. I have reviewed it. I haven't reviewed it recently, so I can't, you know, really speak to it in any detail.

Q. Why did you not use any of the benzene content listed in that data when you were calculating the ART figures for the mineral spirits cleaning?

A. Well, because what I was trying to do was capture, you know, what -- what the range could have been, and, you know, I didn't really have the unique data that would let me anchor the -- the number to a specific Varsol product. I was just trying to, you know, capture the range and midpoint values.

Q. When you used the ART model on the Safety-Kleen parts-washing activity --

A. Uh-huh.

Q. -- you used 58 parts per million from Fedoruk; correct?

A. I did.

Q. Why did you feel that it was not appropriate to use that same value for the mineral spirits used for the other task in the bucket?

A. Oh, I see. Well, partly the mineral spirits, you know, in the parts washer -- what I was trying to capture there was that it wasn't fresh material. You know, it could have been used for some period of time before those measurements were taken.

Whereas the mineral spirits that were used in this bucket-cleaning procedure, you know, he got directly from the painters, and so I assumed this was fresh material.

Q. Are you saying that the figures from Fedoruk were not from fresh material?

A. No, but I -- no, what Fedoruk did to get to 58 is, he actually spiked to get up to that level.

What I was trying to reflect was what was more typical in -- in use of a parts washer. And so when I did my -- or when LeBlanc actually -- she was investigator -- did her calculations, we, you know, basically did -- I used the same calculation here to say, Well, for the sake of comparison, I'll

use the same value that Fedoruk did.
Q. So you are assuming when you did the Safety-Kleen ART calculation that that mineral spirit product when it was put in the parts washer had a higher benzene content, but you conservatively used 58 because you think it was sitting there for a while.
MR. DuPONT: Objection. Form.
A. Well -- and there's a whole literature around, you know, the whole rate at which the benzene decays or is released from the -- from the liquid solvent in the parts washer. So that was what I was trying to reflect, was that, you know, the -- the mineral spirits that was in the parts washer wasn't necessarily fresh.
Q. You don't have any evidence of that, though, right? You're just making an assumption that it wasn't fresh?
MR. DuPONT: Objection. Form.
A. Well -- and I think it's a pretty good assumption. You know, I mean, that's the whole point of the -- the parts washer is to, you know, recirculate the solvent, so it's -- it's used, you know, repeatedly.
Q. What was the fresh mineral spirits content

that Fedoruk used nonspiked?
MR. DuPONT: Actually, that's a misrepresentation, so -- and a compound question.
Q. You can answer.
A. Okay. Well --
Q. If you understand it.
A. Well, I think I do. I mean, I think, you know, based on what he wrote in -- in his paper, a couple of things: One is that he did it in California in 2003 -- I think is when he actually did the experiment.
And so getting the mineral spirits, you know, as his starting point, it was probably California, low benzene -- you know, low aromatics, Rule 66 mineral spirits; and I think the one level of exposure that he used or level of benzene was 9 parts per million.
So it was quite a different mineral spirit formulation than would have necessarily been used in North Carolina in the '80s.
Q. Okay. You also cited in your report to Hunting '95, and you stated that Hunting '95 referenced Varsol containing 1 percent benzene?
A. Uh-huh.
Q. Do you recall that?

A. I do, yeah.
Q. When's the last time that you looked at Hunting '95?
A. Well, it was the last time I did a deposition.
Q. Do you know what the citation that Hunting used for that reference was?
A. I don't remember it off the top of my head. I remember we looked at it at that last deposition.
Q. I'm going to hand you a copy of it. I'm going to mark it as Exhibit 10.
(Exhibit Herrick 10, Article: "Haematopoietic Cancer Mortality Among Vehicle Mechanics.")
Q. You can look at the whole thing, but I'm going to point you to that section where she talks about that right up here, and she references footnote 34 for that comment.
A. (Witness reviews document.)
Q. What is footnote 34 a reference to?
A. Well, that's a health hazard evaluation from -- conducted by NIOSH.
Q. Have you ever seen it?
A. Well, I've looked for it, and I've never

been able to find it.
Q. So you don't know whether it says in that NIOSH document that Varsol contains 1 percent benzene?
A. I haven't been able to get that document from NIOSH. I mean, I know that's what she said here, but I -- I recognize that, you know, there's -- there's something missing in the way that's cited.
MR. DuPONT: Objection. Form.
Q. You were at NIOSH, correct, for a while?
A. Yes.
Q. Are you aware of NIOSH ever taking a position that Varsol contained 1 percent benzene?
MR. DuPONT: Objection to form.
A. I -- no, I am not.
Q. For your ART run on this mineral spirits cleaning in the bucket, you assumed a one-hour constant exposure; is that fair?
A. I think that's what I put in there, yeah. One hour.
Q. Where did you get that number?
A. Let me take a look.
I -- I'm -- I'd have to go back into the -- his work history discussion, but I think --

let's see. This is his description: They would place the fasteners, bolts into the pail to clean them, and he would soak the items for about 30 minutes before brushing. So that was during his deposition.
Q. You assumed, then, 30 minutes for soaking and 30 minutes for brushing?
A. Yeah, I said, Well, if he spent one hour a day, if he soaked them for 30 minutes, spent the second 30 minutes brushing, then -- so for his daily exposure, I'll use the value of one hour.
Q. You're assuming, though, that his exposure was one hour for both soaking and brushing combined, though; right?
A. That was my approach to it, yeah; that he was -- the total cleaning process was one hour.
Q. You assumed different values for cleaning and brushing after soaking for other companies' products in this case, such as the Safety-Kleen task of 7 minutes, 14 minutes.
Why did you assume 30 for the parts in the pail?
MR. DuPONT: Compound.
A. Well, I think that was from his deposition. I could try to find it here and -- but

I didn't just hallucinate 30 minutes. I mean, I think that's what he testified to.
Q. If he did not testify to that, would your values change?
A. Yeah, they -- yeah, I would have -- yeah, it would have, you know, resulted in a -- a different calculation, yeah. Yes.
Q. The ART model, as we've seen you use it in this case and also in LeBlanc, allows you to separate out tasks into separate activities; correct?
A. That's correct, yeah.
Q. So you could have, if you wanted to, done a 30-minute soaking task and a 7- or 14-minute brushing task, or even a 30-minute brushing task; you could have separated those out; correct?
A. Yeah, it does let you put in the different activities, yeah.
Q. Why did you not do that for the -- the parts-washing in the bucket?
A. Well, that's a good question. I mean, I -- I could have. I -- I just didn't -- I didn't think of doing it that way, but I -- I could have.
Q. Wouldn't it have been more accurate to do it that way?

MR. DuPONT: Objection. Form.
A. You know, I don't know. I'd have to -- I'd have to take a look at it again, because -- well, you know, I could -- well, I -- I can't really do it just sitting here, but, you know, I'm just trying to, kind of, visualize what would generate more benzene vapors. Is it just, sort of, the passive soaking, or is it, you know, actually taking something that's, you know, coated with solvent and then, you know, physically trying to dislodge, you know, whatever is on the surface with some kind of a brush, whether that would actually contribute to a greater generation of vapor than just the passive soaking.
And I actually don't know the answer to that, but, I mean, it would be interesting to look at.
Q. But you did that separate calculation for the Safety-Kleen parts washer?
A. Well, that -- yeah, in fact, that was -- you know, what I was trying to do there was follow through on the same set of work activities that Fedoruk had done, 'cause I wanted to be able to compare it with his results.
Q. And that separate calculation was done in

LeBlanc?
A. That -- right. That was the approach that took, yeah.
Q. You were part of that, though; right?
A. Well, I was her advisor, yeah, when she was a student.
Q. You were a coauthor?
A. Uh-huh -- yes.
Q. In the Safety-Kleen scenario, you assumed 14 minutes for brushing parts that were described as transmission parts?
A. I don't remember.
Was this in LeBlanc?
Q. No, I'm sorry.
In your report in the ART runs in the back in the appendix --
A. Uh-huh.
Q. -- you assumed 14 minutes for Safety-Kleen brushing of transmission parts.
A. Oh, okay. I didn't -- it doesn't -- it's not critical that they be transmission parts.
Q. That's fine.
A. Yeah.
Q. You understand, though, that when he was cleaning parts in this small bucket, he was

cleaning bolts and fasteners.
MR. DuPONT: Objection. Form.
A. I think that's plausible. This was when he -- let me take a look. I mean, I think I may have even tried to mention that.
Q. I actually think you just mentioned it when you were going through it with me.
A. Yeah, I said, "They would place fasteners/bolts into the pail to clean them."
Q. Would you expected it to take more or less time to clean a fastener or a bolt with a brush than a large transmission part?
MR. DuPONT: Objection. Form.
A. I think it would depend on the part, truthfully. In some of the -- the work I've done in another case, you know, the whole -- the whole topic centered around cleaning transmission parts, you know, from vehicles, from automobiles. And in that case, you know, there were situations where it probably took longer just because of the nature of the material they were trying to remove.
I don't really know what condition the fasteners and bolts that he was cleaning would have been in. So I guess I can't really, you know, offer much of an opinion on that.

MR. DuPONT: It's been an hour and 15 minutes -- if you get to a good time for a break.
MR. SCHULTZ: Sure. We can take a break.
Q. Let me ask you one question before we move on: The 60 minutes of exposure that you calculated for this activity, where would Mr. Rhyne's breathing zone being be during that activity?
A. Well, that's good.
Well, I -- you know, not having seen it -- and no one really asked him that level of detail -- I would be pretty confident that when he was doing the brushing, he was definitely, you know, within that, sort of, 2 1/2 foot, 3-foot distance that we tend to think of as the breathing zone.
And when he was doing the soaking, you know, it's possible that it didn't require that he be there, you know, in direct proximity, you know, to that pail, since my impression was that the soaking was just, sort of, a passive process.
Q. So you're assuming that he would likely walk away from the bucket while it's soaking.
MR. DuPONT: Objection. Form.
A. You know, I don't know him well enough to know what his work habits would have been. I mean, it's -- if he had something else going on that he

went over and checked on, or if he went and talked to one of his friends, or if he, you know, basically just stood there, working a crossword puzzle, you know, I really have no way of knowing.
Q. Assuming that his breathing zone was not within 2 or 3 feet of the bucket for the soaking process, he wouldn't have a near-field exposure during that time; correct?
A. Well, if -- if that's the correct assumption; that he, you know, moved more than, say, 3 feet away from the bucket, then, right, he would be outside the near field.
MR. SCHULTZ: We can take a break. Thank you.
(Recess was taken.)
Q. Doctor Herrick, just want to circle back on a couple of things: In your materials that you provided this morning via Mr. DuPont, I saw a reference to a NIOSH document. It's entitled, "Kaiser, 1990 NIOSH."
A. Oh.
Q. Do you recall that?
A. Yeah. Yeah.
Q. What relevance does that have in this case?

A. Oh, it's a health hazard evaluation where they were looking at benzene from blanket wash product, you know, from a -- from a printing process. And Kaiser did some air sampling there and measured benzene about 1.1 parts per million in the air when they were using this blanket wash material.
Q. Did you cite to that in your report?
A. No, I just -- no, I didn't.
Q. What -- what relevance does it have to your opinions in this case?
A. Only, you know, just in -- in the sense that using these petroleum-based solvents can result in benzene exposures in the range of a part per million.
Q. Did you know what the content of the liquid content was of that blanket wash?
MR. DuPONT: Object to form.
A. I don't off the top of my head. I'll have to dig it up.
Q. Can you use ART to calculate exposure in mineral spirits?
A. It turns out you can, yeah. You know, I didn't realize that until fairly recently that you could, you know, dial that in as a mixture.

The thing you have to try to do is come up with a decent value to use for its vapor pressure.
Q. Could you have done that in this case and -- and done a calculation?
A. You -- I mean, the -- the short answer is yes -- you know, with the caveat that, you know, as I'm sure you know, there's a wide range of values for the vapor pressure of mineral spirits. And so I -- I don't know that I'd have a lot of confidence in -- in the model's output. You know, it's a typical thing with a model. It can only, you know, predict based on the quality of the information that you give it.
Q. Another input that you chose to -- to use when calculating the exposure to mineral spirits in the bucket was the -- the size of the bucket; correct?
A. Let me just take a look. I think I -- I mean, that's -- that's here in the appendix.
(Witness reviews document.)
Q. So you assumed a 5-gallon bucket was used for this task?
A. Yeah, that was the recollection, I think, that he had from the -- in his testimony, yeah.
Q. You believe Mr. Rhyne testified about the

size of the -- the pail or bucket that he used?
A. Sitting here right now, I don't remember -- and I think I remembered him describing it. Whether he actually specified it was 5 gallons or not, I -- I don't remember.
Q. Did you assume the bucket was full of mineral spirits?
A. Pretty -- yeah, I think that would be -- you know, just trying to visualize the way he would have done -- maybe not, like, full to the brim, but if you were going to get a bucket and put parts in it -- these bolts and nuts and stuff -- you know, I would imagine that it would be at least, you know, say, two-thirds, three-quarters full.
Q. Do you know what the surface area is of the 5-gallon bucket?
A. I don't offhand.
MR. DuPONT: Objection to form.
A. You know, we could -- we could do the calculation. I mean, in my model the situation I used was an open surface between .3 and 1 square meter.
Q. That's also the same selection that you used for parts washer; correct?
A. I think so. I could check.

Q. I'll represent to you that it is the same.
A. It is? Okay. Sure.
Q. You would agree with me that the surface area of a 5-gallon bucket is smaller than a parts washer; correct?
MR. DuPONT: Objection. Form.
A. Well, I'm trying to remember what we -- 'cause it's -- it's in the Fedoruk paper, and, you know, it's in LeBlanc too what the actual dimensions of the part washer -- you know, the open tank was, and I don't recall that right off the top of my head.
Q. In Fedoruk there's a description of the parts washer as being 24 inches by 12 1/2 inches. Does that sound familiar to you?
A. That sounds about right, yeah. Yeah.
Q. Would you agree that that's larger than the surface area of a 5-gallon bucket?
MR. DuPONT: Form.
A. 24 by 12? I think they're pretty comparable. I'm just trying to -- you know, visualizing, you know, that's 2 square feet, right? That's 24 by 12. So that's a 2-square-foot opening.
You know, say roughly the size of, you

know, this manila-folder thing that we have here (indicating); and the area of a -- a 5-gallon bucket -- you know, I can't do the pi parts square calculation thing in my head, but I -- you know, my sense would be that they're -- they're in the same order of magnitude.
Q. If I were to represent to you that the -- the square meters of the Fedoruk parts washer was .1935, would you have any reason to dispute my calculation?
A. Well, I haven't done the calculation, so if -- if that's what 2 square feet converts to, sure.
Q. Or 24 inches by 12.5; correct?
A. Uh-huh.
Q. Okay. Can we agree that a 5-gallon bucket is about 12 inches across?
MR. DuPONT: Object to form.
A. That -- that -- sure, we can agree to that.
Q. If I were to represent to you that the square meters on a 12-gallon [verbatim] bucket surface area, then, would be .0729 square meters, would you have any reason to dispute that?
MR. DuPONT: Objection. Form.

A. No, I'm not going to question your calculation.
MR. DuPONT: If you don't know, then say you don't know.
Q. That's certainly smaller than the Fedoruk number; correct?
A. When -- was that .11 --
Q. .1935.
A. Oh, 1935 and .07, yes.
Q. There are other surface area selections in ART that would fit into the .0729 square meters surface area; correct?
A. Right, I could have chosen a -- a different area.
Q. The correct selection could have been 0.1 meter squared or less?
A. I think that -- that certainly is possible, yeah.
Q. And if you had used a smaller surface area input in your ART calculation, the final output would have been lower as well; correct?
MR. DuPONT: Objection. Form.
A. Yeah, I don't -- you know, I could take a look at it. I don't know just in here, I mean, how much lower, but I think it could have been lower,

sure.
Q. "Surface activity class" is another input that you used to calculate this ART figure for mineral spirits in the pail?
A. Right.
Q. And for the "Surface activity class," you selected a subclass of "Activities with agitated surfaces"; correct?
A. Uh-huh. Right.
Q. And this activity subclass was used for the entire 60 minutes; correct?
A. Yes.
Q. Would you agree with me that ART describes that activity subclass as analogous with mechanical mixing, gas bubbling, and boiling?
A. That -- I think that's what -- that's what appears when you make that selection, yeah.
Q. And those things were not happening to a pail of mineral spirits sitting stationary; correct?
A. No, they probably weren't.
Q. How or why did you assume that the mineral spirits was being agitated for 60 minutes?
A. Well, I could have chosen a different activity class, sure.

Q. And there is an activity class that was available to you entitled, "Activities with relatively undisturbed surfaces"; correct?
A. Right.
Q. And you used that activity subclass for the soaking task in the Safety-Kleen analysis and also in LeBlanc; correct?
A. Correct.
Q. But you did not use it here for the pail.
MR. DuPONT: Object to the form.
A. No, as you said, I -- I had the other activity chosen.
Q. You -- if you had used an "Activities with relatively undisturbed surfaces" input, the number would have been lower; correct?
A. I think that's probably true, yeah.
MR. DuPONT: Objection. Form.
Q. Do you know how much lower?
A. No, I don't.
Q. Do you recall in LeBlanc that the agitated surfaces was only used because of compressed air and spraying?
A. And spraying or...
MR. DuPONT: Object.
Q. Yeah.

A. Compressed -- could you repeat that one.
Q. Do you agree in LeBlanc that the selection of agitated surfaces was only used when compressed air or spraying was taking place?
And I can show you LeBlanc.
A. Okay, yeah. Yeah. I'm not questioning. I'm just trying to remember. You know, I mean, that does sound right, yeah.
Q. And there was no compressed air or spraying going on in the pail of mineral spirits; correct?
A. Right.
Q. Now, for this pail of mineral spirits it appears you have also modeled a far-field exposure.
A. Right.
Q. And that, according to, I think, your testimony this morning, is due to a second exposure source; correct?
A. Right.
Q. What is that exposure source?
A. Yeah, in this case I -- you know, that probably should have been left just as a near-field.
Q. Okay. If we had removed the far-field calculation, how much would it have taken off of

your benzene estimate?
A. Yeah, I would have to do the calculation. I can't just estimate it.
Q. Do you have any -- I don't know if it's in your spreadsheet or if you have it in some other format -- when you did your ART runs for the near field and the far field at the different values of benzene, do you have a number of what the near-field number was, versus the far field?
A. When you say, "number," are you referring to the -- to the input?
Q. No, the output.
A. No, it -- it gives you just a single result. I mean, it doesn't really, you know, give you that separate.
Q. So for the -- the 50-part-per-million mineral spirits, it came up with a 5.8 milligram per cubic meter result.
A. Right.
Q. In the 50th percentile?
A. Right.
Q. You don't know how much of that is attributed to near field and far field?
A. No, you can't tell just, you know, from these results.

Q. You could tell if you ran it without the far field, though; right?
A. Right, that would be the way to do it.
Q. Would it surprise you to know at 50 parts per million that the far field value was 4.3 milligrams per cubic meter?
MR. DuPONT: Objection. Form.
A. What was the near field?
Q. Would have been the balance. It would have been 1.5.
A. So the -- I don't think that is possible.
So you're saying the far field result is actually higher than the near-field result?
Q. That's correct.
A. I -- I don't see how that can be. The near field is, you know, the 2-feet distance from the source; whereas the far field is, you know, everything further away.
It's just -- that isn't really possible.
Q. I agree. It's confusing to me as well. I'm -- I'm wondering why for the far field you chose an open surface of 3 meters squared for the mineral spirits with the pail?
MR. DuPONT: Objection to form.
A. Oh, I see where you are. (Witness reviews

document.) Just sitting here now, I don't remember how that would have been chosen.
Q. But that's significantly higher than the pail value that you used in the near field of .3 to 1; correct?
A. Uh-huh -- yup.
Q. Do you think that could account for the reason for why the far field would be higher than the near field?
A. I guess it's possible. I'd have to -- you know, I'd have to look into it a little more just to see where -- you know, what's contributing to those levels.
Q. But it is also true that you assumed that he was being exposed to the near field and the far field for the entire 60 minutes; correct?
A. That's correct, yeah.
Q. And it sounds like that has overestimated your calculations?
A. Well, I think, you know, the -- the calculation, you know, definitely could be redone, you know, looking only at the near-field contribution, yeah.
Q. You used the activity coefficient of 1.5 for benzene at all three values; correct?

A. Right.
Q. What's the citation or the basis for that assumption?
A. Well, that's -- there's a -- within the -- the data within the -- the software -- or within the -- the program, rather, there's a series of choices; and so for dilute solutions of hydrocarbons like this, that's, kind of, the default value of 1.5.
Q. Correct me if I'm wrong, but I believe when you were being cross-examined by Mr. Fishkin this morning, you testified that you used the value of 1 for the CRC product.
A. I did, yeah.
Q. Why did you choose the higher value for the Varsol -- I'm sorry for the mineral spirits?
A. Well, I mean, it could have been 1. That particular input value isn't really crucial in terms of the overall model performance.
Q. But if it was 1, it would have decreased your values in some respect.
MR. DuPONT: Objection. Form.
A. You know, I really don't know. I'd have to take a look at it.
I mean, the really crucial value is the

mole fraction. I mean, these are -- activity and the mole fraction are both, kind of, getting at the same underlying concept, is the concentration of the analyte in the mixture.
Q. If you look again at the 50-part-per-million mineral spirit ART run, there you chose a mole fraction of .000104 for far-field exposure.
A. Right.
Q. That correlates, I think, to 58 parts per million?
A. Right.
Q. And then you used a different number for the mole fraction for the near field.
A. Right. That's -- that's what corresponds to the -- oh, I see what you're saying.
I'd have to take a look at what -- you know, what the mole fraction of what that .000104 actually corresponds to in terms of parts per million. I don't have that right off the top of my head.
Q. But we can agree, though, I think, based on your testimony, that we can exclude the far-field exposure from your analysis for the mineral spirits in the pail?

A. I think the -- the correct approach would be to model just the near field.
Q. You also assumed that for the near field that this activity was taking place indoors.
Do you see that selection?
A. I do, yeah.
Q. Why did you choose "Indoors"?
A. Well, my -- my recollection from the way he described this process was that it was an indoor process. He was doing it inside the facility.
Q. What facility?
A. I have to take a look and see how he described it.
Q. This was the McGuire nuclear facility, I believe --
A. Okay.
Q. -- during that 1980 to '81 time period.
A. Let me just take a look. (Witness reviews document.)
Yeah, so this was during the time he was on the pipefitting crew.
Q. Not in the pipe fab shop; correct?
A. Right. Right.
Q. So this time you described on page 9 of your report.

A. Uh-huh. Yeah, I see it.
Q. Sorry. Just give me one second.
So what about the facility did you believe to be indoors when he was walking around, not while working in the pipe fab shop?
A. Well, what I recall is -- and, again, this is the way he described it -- was that "He recalled going to the painters to get the Varsol; they would pump it out of their barrel into an open pail that he would then carry back to his workstation."
And so --
Q. This was -- sorry.
A. I mean, so from that, you know, I don't remember that there was any, you know, discussion in the deposition about whether his workstation was indoors or outdoors. I assumed it was indoors.
Q. Do you recall him describing that facility as humongous?
MR. DuPONT: Objection to form.
A. That term probably came up. I don't remember, but it wouldn't surprise me.
Q. Now, for another task that Mr. Rhyne did at Duke Energy for using Kutzit to remove gaskets out in the facilities --
A. Uh-huh.

Q. -- not in the pipe fab shop, you selected "Outdoors."
A. In the ART modeling?
Q. Yes.
A. Oh, okay.
MR. DuPONT: Are you saying at Duke?
MR. SCHULTZ: Yeah.
Q. Why did you select outdoor for the gasket work out in the shop -- or out in the field, not shop, but for the mineral spirits in the pail -- out in the facility not in the shop -- you selected "Indoors."
MR. DuPONT: Objection. Form.
A. I don't recall. I don't really know the answer to that.
Q. Would it have been more appropriate to use "Outdoors" for the mineral spirits with the pail?
MR. DuPONT: Objection to form. Hold on.
Why don't we look at your report and confirm what he's saying is true.
MR. SCHULTZ: I object to that question as saying I'm misrepresenting what's in his report.
MR. DuPONT: Well, there are multiple different time periods at which Varsol was used. So if you're --

MR. SCHULTZ: You mean Kutzit?
MR. DuPONT: Excuse me -- Kutzit was used. So --
MR. SCHULTZ: Yeah, I'm talking about his ART run, which was, I think, the first one.
MR. DuPONT: The one that says, "ART reports spreading Kutzit for removing gaskets at home"?
MR. SCHULTZ: Yes. I believe that was a misprint, 'cause he was not removing gaskets at home. He was removing gaskets at Duke.
MR. DuPONT: No, that is not a misprint, 'cause he testified to removing gaskets on vehicles on his family's car at home, which is exactly why I asked him to look at the report to determine whether what you were representing were true or not.
A. Well, just on the Kutzit point, I mean, that is correct that I did the modeling outdoors for his work at home because there was really no data available on Kutzit as it was used outside. So that's --
Q. Did he use Kutzit to remove gaskets at Duke or --
A. Well, definitely at home.

MR. DuPONT: Compound.
A. Let me just check and see, 'cause I had that in the report about where -- what he would have done at Duke.
(Witness reviews document.) Yeah, so I have he used Kutzit at home, and that's when he was doing it outside. And, then, he also used Kutzit at Duke, removing gaskets from flanges.
So, I mean, the answer is, I have it that he used it as both places.
Q. If you look at Table 3, when he used Kutzit in Duke Energy maintenance, that .024, was that calculated with ART?
A. I think so. Let me just double-check it. (Witness reviews document.) I'm sorry. Could you repeat the question. I just want to make sure I...
Q. Table 4, the .042 value for Kutzit, was that calculated with ART?
A. That's working outdoors on his vehicles? Is that the one?
Q. It says, "Duke Energy -- Maintenance."
A. Oh, Duke. Okay. (Witness reviews document.)
Oh, no, I didn't use ART for the work that

he did there.
Q. How was that calculated?
A. Yeah. I'm looking right now. So I think I took the same approach at Setzer's and also at Duke for his Kutzit use that, since he was Kutzit in 1985, that it was containing between 25 and 50 percent toluene, and I assumed that the toluene was from .1 to 1 percent benzene, so then I did the calculation of the benzene content of the Kutzit when he did that; and I adjusted the proportion of the airborne concentration from that data that we had from the Young experiment, and -- and, you know, used that proportion and calculated that for the one-hour period when he used the Kutzit with 25 to 50 percent toluene, his daily exposure was .08 parts per million.
Q. So this ART run does not apply to Duke Energy.
A. No -- and I'm on page 36 in the text -- but I -- I didn't use the ART approach for the Kutzit use at Duke.
Q. For the Varsol with the mineral spirits in the pail, you selected good natural ventilation as well?
A. Right.

Q. I apologize. Going back to the selection about the size of the room, you selected "Any size workroom" for that facility?
A. I did, yeah.
Q. He -- he did not testify to using Varsol -- I'm sorry -- mineral spirits in a pail in a workroom; did he?
MR. DuPONT: Objection. Form.
A. Well, I think what we were looking at from his testimony was that he said he got the pail from the painters, and then he took it back to his workstation.
Q. His workstation was not in a workroom; correct?
MR. DuPONT: Object to form.
A. Well, that's why I used -- no, I mean, it wasn't necessarily in a workroom, and that's why, you know, for that selection in the ART -- of the ART choices I basically chose any size room.
Q. You -- I think you testified earlier you did not know the air changes per hour for good natural ventilation?
MR. DuPONT: Object to form.
A. I don't have a good number that I could, you know, refer you right here.

Q. If I were to tell you that it was .3 to 3 air changes per hour, would that sound right?
MR. DuPONT: Form.
A. It's probably reasonable -- I mean, within -- you know, I mean, "good" is, kind of, a, you know, undefined term in a sense, but that's probably roughly what we have in here, and I would say this is pretty good natural ventilation.
Q. Well, that's what I was going to ask you. I mean, .3 to 3 air changes per hour is the same as in a residential building or a house; right?
A. Some houses, yeah. I mean, it's -- it's a good airflow for, you know, spaces that are, you know, general occupancy.
Q. Would you think that is analogous to a nuclear power facility?
MR. DuPONT: Object to form.
A. In terms of just, you know, sort of, the general open space inside the building, I think that's reasonable, yeah.
Q. There is measurement in literature about what air changes per hour happen in factories and facilities that are like the size of this place?
MR. DuPONT: Object to form.
A. There's -- there's, sort of, general

reference values, you know, that people use. I mean, this would be in facilities that don't have, you know, specific point sources of some emission or something like that, yeah.
Q. Are you familiar with the Burton Field Guide?
A. Yeah.
Q. It's a source that you would rely on?
MR. DuPONT: Object to form.
A. Well, I've used it. I mean, it's one of the sources of, you know, ventilation information in -- in general practice, yeah.
Q. Do you know what the air changes per hour referenced in the Burton Field Guide for factories is?
A. I don't remember -- I don't remember a single number. I mean, there's -- there's -- no, I don't.
Q. You think it's higher than 3?
MR. DuPONT: Object to form. Foundation.
A. I actually don't know. I don't remember the number.
Q. That's fair.
You didn't research, though, for this case; right?

A. Well, you know, it's one of those things I've used many times, but just sitting here right now, I'm not -- I'm just not getting the number that I can call up for you.
Q. You noted on page 37 that you assumed for this hour of usage of the mineral spirits in the pail that the benzene content was constant?
MR. DuPONT: Object to form.
A. Over that one hour time; correct.
Q. Correct. Yeah.
You agree that LeBlanc notes that this is, sort of, a limitation on the ART model.
MR. DuPONT: Objection. Form.
A. Well, it is. Not just in this application, but that it doesn't really let you address a change in emission rate.
Q. And then you reduced it by 50 percent, based upon a citation to -- was it Nicis?
A. Well, Nicis took Fedoruk's information about the rate of emission of benzene and -- and developed a modeling approach to try to expand on it -- and actually Williams did the same thing.
Q. So in the Nicis publication he assumed that -- I'm sorry -- he concluded that the benzene content of the parts washed in solvent had

decreased 50 percent after five hours of use; correct?
A. That was what -- yeah, that's what Nicis concluded, yeah.
Q. And so you used that 50 percent value for the next day's benzene content value; correct?
A. Yeah, I thought I was, you know, trying to, kind of, be conservative and -- and say, well, even though it was only really used for -- for an hour -- and it wasn't used in the same way, you know, the rate of the Nicis was referring to was in the parts-washing application, you know, where you have the spraying and all that going on, but I thought it was a reasonable approximation.
Q. Nicis noted that that's an exponential rate; correct?
A. It is, yeah.
Q. So after another 5 hours, would it go down another 50 percent?
A. Well, that's what I was trying to -- to, you know, address here is that, the Nicis, you know, calculations were based on actually using the parts washer for five hours. So you had this five hours of active agitation and spraying and brushing and so forth.

Whereas in this case, there was an hour of -- of soaking and -- and then brushing, say, in total, and then the remaining time it was just a quiescent -- you know, just sitting there in the pail. There wasn't any of this activity going on.

So I felt like, Well, okay, since there was nothing going on to agitate or -- or release the components of the solution, I'll say conservatively that, just sitting there overnight, it lost 50 percent.

I mean, I actually think it probably lost less.

Q. Less?

A. Sure, because it was just -- it's just sitting there. You know, it isn't -- there isn't any energy being applied that would cause benzene or anything else to evaporate.

Q. But we're talking probably about 16 to 20 hours between usage; right?

MR. DuPONT: Object to form.

A. Well, if it sat overnight, yeah.

Just since we're on that point, you know, there isn't really unanimity around this value that Nicis has used about the rate at which the benzene comes out of mineral spirits. And, in fact, this

article -- I think it might be in the package that Plisko and Spencer wrote addressed that, by measuring benzene on three consecutive days from a parts washer -- mineral spirits parts washer, and found that the rate of benzene depletion was much lower.

Q. That was Plisko and Spencer?

A. Uh-huh.

Q. For the purposes of the mineral spirits used in the pail, what data did you use to validate your model output?

A. Well, like any of these model predictions, I didn't formally validate the result. I think we talked about this this morning. I don't really consider that, you know, these models' results -- that anyone really "validates" them in the strictest sense.

About the closest, you know, that I would say we've done is that LeBlanc paper, where we tried to evaluate how well the results compared with each other.

Q. Do you have LeBlanc?

A. I think it's in -- I don't have it with me right here as we sit --

Q. Okay.

A. -- but it's in -- I think it's in the folder.

Q. Let me give you a copy of it -- I want to ask you about.

MR. SCHULTZ: We'll mark it as Exhibit 11.

(Exhibit Herrick 11, Article: "Comparison Of the Near Field/Far Field Model and the Advanced Reach Tool (ART) Model V1.5: Exposure Estimates to Benzene During Parts Washing with Mineral Spirits.")

Q. Again, you can review the whole thing. I assume you're familiar with it, since you're an author, but I'm going to point you to Table 5.

A. (Witness reviews document.)

Q. Now, would you agree with me that Table 5, the values that are listed under the first column, "Estimated TWA during parts washing ppm" are for 60 minutes?

A. Let me take a look just to make sure I've got the...

Q. And if you want to look back at section 3.1, it's reporting "ART mechanistic model alone predicted a TWA airborne concentration -- 50th percentile -- of 4.25 ppm during the reported 60 minutes."

A. Oh, okay.

Q. So do you agree with me that the first column there in Table 5 is they're all 60 minute exposures being compared?

MR. DuPONT: Form.

A. I'm not -- well, I mean, that's definitely the case for the LeBlanc data, and she reports it with the Bayesian adjustment.

In 3.1 -- oh, I see. Yeah.

Well, the Near Field/Far Field stuff there, that .33, that -- that's the 60-minute value.

Q. Okay.

A. And --

Q. Let's just talk about those first three, then -- I mean .425, .5 and .3. Your 60-minute value for mineral spirits was 4.5. I mean, roughly 10 times that value; is that fair?

A. I'd have to take a look. I think so.

Q. Does that not give you any kind of pause about validating your results, when I think you just said that LeBlanc was a pretty good validation tool?

A. (Witness reviews document.)

MR. DuPONT: Objection. Form.

A. I'm going to have to ask you where that -- 'cause I'm looking on my page 37, and from my looking here, I'm looking at 2.2 parts per million for a one-hour average from using Safety-Kleen.
Q. I'm asking you about the parts -- I'm sorry -- the pail of mineral spirits up above.
A. Oh, oh, oh, the pail, as opposed to the...
No, I'm actually not completely surprised by that. I mean, it seems to me, you know, you've got a very different kind of exposure scenario going on there, where, you know, rather than having this device that, you know, is -- is recirculating the solvent and -- and, you know, has the basin, that you've got this open pail of mineral spirits that can evaporate to the surrounding air.
So I'm -- I'm not really surprised to see that there's a higher exposure there.
Q. You think the pail should have a higher exposure?
A. Oh, I think it easily could, I mean, just given the way the parts washer is designed. You know, it's got the sides, you know, so the -- there's a -- you know, most of the solvent's actually down underneath in the reservoir, and, then, you've got the -- as we were just talking

about earlier, you have this sort of a little tray device and, you know, it's got a cover that partially comes down on the top. So you've got a whole lot less susceptibility to, say, cross-currents and airflow around it, and I -- I don't find it implausible that you could have a difference like that.
Q. I believe earlier you just testified that you thought the benzene would evaporate out of the mineral spirits parts washer faster than the pail; correct?
MR. DuPONT: Objection. Form.
A. Oh, this was comparing, like, letting it sit overnight. Yeah, it's a little bit apples and oranges, though. I was just referring to when something was sitting there with actually -- with no, you know, nothing being done to it -- there's no parts in it, there's no brushing -- it's just actually sitting there completely quiet.
Q. But you compared that to the mineral spirits parts washer being used; right?
MR. DuPONT: Object to form.
Q. And agitated.
A. That was the point of that comparison when I was saying that I thought that the values

for the depletion that Nicis used were, you know, reasonable to apply to the bucket just sitting there quietly overnight.
Q. So even though we -- we agree that you can strike the far field from your analysis, you still think that your 4.5 ppm value for an hour is accurate?
A. Well, no -- I mean, I -- you know, I think I admitted earlier that I would -- I would redo that calculation and focus it only on the near-field contribution.
Q. But when you saw this and you saw that it was 10 times the values in LeBlanc for an hour, that didn't trigger anything to say, Hey, something must be off in my calculation?
MR. DuPONT: Objection. Form.
A. I don't, you know, remember exactly making that direct comparison, but, you know, I -- I would like to revisit that calculation, sure.
Q. But LeBlanc is something you would have used to validate the -- the results; right?
MR. DuPONT: Objection. Asked and answered.
A. I really wouldn't. I mean, again, I -- you know, I kind of am reluctant to characterize

these comparisons as validations to begin with.
Q. For the Kutzit scenario, the -- the ART model that you ran, it's attached -- I understand now you're saying that's during the home use -- you estimated 50 percent benzene in that product during that calculation in ART; correct?
A. I think -- I think that's right, yeah.
Q. And for your ART calculation for the mineral spirits in the pail, you estimated 500; correct?
MR. DuPONT: Part per million?
Q. Yeah, 500 part per million.
A. On the first day, and, then, less on the second day. Yeah, that's right.
Q. Okay. Fair.
The one-hour usage calculation for Kutzit is 130 parts per million on page 34.
Do you see that?
A. I'm -- I'm looking right now.
MR. DuPONT: Are you talking about outdoors?
MR. SCHULTZ: Yeah, this is the 1974 calculation on page 34.
MR. DuPONT: You're saying that's outdoors?

MR. SCHULTZ: Yeah.
MR. DuPONT: That's your representation?
A. I'm sorry. Help me find this on 34. Are we talking about --
Q. It says, "So for the years before '75 I used the value of 130 parts per million for the benzene exposure. Mr. Rhyne used Kutzit for a one-hour period."
A. And that's taken from that Young -- so it isn't a modeled result. That's the average measurement that Young took over that 25-minute period.
MR. DuPONT: That said Seltzer's not outdoors.
Q. Okay. So this is using 52 percent from Young.
A. Right.
Q. Okay. And you're using a value of 130 part per million.
A. Yeah, for -- that was for the use at --
Q. Setzer?
A. -- Setzer's, thank you. Right.
Q. So let me ask you this: If you calculated a one-hour exposure to mineral spirits in a pail at 4.5 parts per million, versus one hour at Setzer at

130 parts per million, that's a factor of roughly 30 or so --
MR. DuPONT: Setzer isn't a calculate -- 130 parts per million is not a calculation.
MR. SCHULTZ: Okay. That's fine.
Q. The value that you chose for the Kutzit exposure in 1 hour was 130 parts per million?
A. Right.
Q. That's about a factor of 30-or-so from the 4.5 you used for the mineral spirits; fair?
A. That's about right, yeah.
Q. Yet that product had approximately a thousand times more benzene than the mineral spirits; correct?
A. Correct.
Q. Does that seem accurate to you?
MR. DuPONT: Objection.
Counsel, look he's already testified about the difference between the near field and the far field. You're beating a dead horse at this point. Why don't you move onto a different topic.
MR. SCHULTZ: Let him answer the question.
A. Well, the point I would make is that, you know, the rate at which these materials -- like, just say benzene -- evaporate or vaporize from

these complex mixtures depend on a lot of factors, including what else is present in the mixture. And the formulation of what's actually in Kutzit, you know, is -- is quite different from what's the inflation in mineral spirits.
So I don't find that to be, you know, too surprising that you had a very different rate of benzene emission between those two materials.
Q. Your model indicates that the action level would have been exceeded for using mineral spirits if your calculation of the eight-hour TWA is indeed .56 parts per million?
A. Just help me.
Are we back on the Kutzit scenario?
Or where are we?
Q. I apologize. On -- on page 39 for the "Daily Exposure Midpoint," .56 for "Mineral Spirits Cleaning" is an 8-hour TWA; correct?
A. On 39?
Q. Yeah.
A. Okay.
Q. The .56, that's an eight-hour TWA?
A. That's his daily average, yeah.
Q. And that would be in excess of OSHA's action level?

A. As an air -- as a daily average, yeah.
Q. Do you think that that is accurate from using a mineral spirits pail one hour a day?
MR. DuPONT: Objection. Form. Compound. Incomplete hypothetical.
A. Well, you know, I -- I would like to go back and -- and revisit that calculation, yeah.
Q. Would you agree that the occupational medicine and industrial hygiene community has instructed industry and persons to use other solvents in place of benzene?
MR. DuPONT: Objection. Form. Beyond the scope.
A. Help me understand: Who are you referring to as actually making that advice or...
Q. Scientific community --
MR. DuPONT: Objection. Form. Vague.
Q. -- which I would assume you hold yourself to be a member of, like the industrial hygiene community?
MR. DuPONT: Objection. Vague. Beyond the scope.
A. Well, I think, you know, there's -- this is one of those aspects where, you know, I think the -- the weight of information is really, you

know, what would drive people or what would bring this to prominence in the minds of the people who can decide, you know, what the materials should be and what the exposures should be.

I don't know that I would, you know, uniquely, you know, link that to the occupational medicine or industrial hygiene community.

Q. What other solvents were -- were industry and persons using as benzene was no longer being used?

MR. DuPONT: Objection. Form. Vague. Beyond the scope.

A. Well, I wouldn't hold myself out as, you know, an expert on material substitution, but, you know, what I did observe over time was that it wasn't unusual to see people -- people substitute toluene for benzene. That was one of the substitution steps that I think was fairly common.

Q. And xylene?

A. I think xylene, although, you know, it's a little -- you know, chemically it's getting to be a little bit different, you know, toluene's a lot more structurally similar to benzene than -- than xylene is.

Q. And mineral spirits?

MR. DuPONT: Form. Vague. Beyond the scope.

A. You know, it depends a little on what the use of the benzene was. If the benzene was there, you know, as some sort of an active reagent, you know, the mineral spirits may have may not have been a good substitution. If it was just there as a solvent or a vehicle, then, yeah, there could have been that substitution.

Q. You agree, though, that mineral spirits' use instead of benzene would reduce exposure to benzene and reduce risk?

MR. DuPONT: Form. Vague. Compound. Beyond the scope.

A. Well, I think, you know -- especially if I compared, say, mineral spirits with pure benzene, there's no doubt that there's less benzene exposure associated with that mineral spirits.

MR. SCHULTZ: Doctor Herrick, I think you answered all my questions. I appreciate your time.

THE WITNESS: Okay. Thanks.

(Discussion off the record.)

EXAMINATION

BY MS. WOOTEN:

Q. Good afternoon. I don't know if we met

off the record or not, but my name's Virginia Wooten, and I represent Turtle Wax in this matter. I just have a few questions for you, and they're mainly going to be a product called Marvel Mystery Oil.

A. Oh, sure.

Q. And just to start, all your opinions regarding Rhyne's exposure to any benzene and Marvel Mystery Oil are contained in your report; correct?

A. That's right, yeah.

Q. And if you look at Table 3 on page 39 in your report, and you go down to where Marvel Mystery Oil is listed, and under the "Daily Exposure Midpoint," it says, "Not determined"; is that correct?

A. That's correct, yeah.

Q. And why is that?

A. Well, it was really my view of the way he was using that particular product, and my recollection was -- you know, and he -- he talked about this in his deposition -- that he was adding that liquid to these cylinders, I think I would call them; they were reservoirs that were on the vibrators that he was doing this maintenance work

on. And so, as he described what he did, it seemed to me that the opportunity for there to be substantial vapor exposure was really very minor.

Q. And, then, in Table 4 on page 43, if you look down at where Marvel Mystery Oil is listed, once again, under the "Cumulative Exposure Midpoint" it says, "Not determined." Is that a similar reason as to why that's not determined in that table as well?

A. Right, because I -- what I, you know, tried to do was -- was talk about -- in -- in the narrative that precedes this -- what was in the record about the composition of the Marvel Mystery Oil; and I, you know, recognized, you know, the -- the ingredients, you know, the petroleum-based ingredients as being things that, over time, you know, could have had benzene as one of the ingredients -- one of the components. But what was really, you know, sort of, leading me to this "Not determined" classification was the way he was using it.

Q. So were you unable to, I guess, get a cumulative exposure based upon the way he was using it?

A. That was really what was -- what was

driving it, yeah.
Q. Okay. So there's no -- you did not calculate any cumulative exposure for Marvel Mystery Oil in this matter?
A. I didn't.
Q. Okay. And if you turn to page 44 in your "Conclusions" page, you would agree that there's no conclusion regarding Marvel Mystery Oil listed on that page.
A. Let me just double-check. (Witness reviews document.) No, there is not.
Q. Okay. And my guess is there's not going to be a model report attached in your appendix specifically for Marvel Mystery Oil in your report.
A. No, I didn't do any calculations or develop any modeling for that.
Q. And if we go back to -- I believe it's page 29 of your report, you discuss Marvel Mystery Oil on page 29, and if you look at the second full paragraph on page 29, it, kind of, discusses Mr. Rhyne's use of Marvel Mystery Oil.
Is your understanding of how Mr. Rhyne used the Marvel Mystery Oil from his deposition?
A. It is, yeah.
Q. Is there any other source you are using to

determine how he would use Marvel Mystery Oil?
A. No, just his description of the -- the way the work process was conducted.
Q. Okay. If you look at that last full paragraph on page 29, the first sentence, and I'll just read it: "As of 1985 Marvel Mystery Oil is reported to contain mineral spirits, 30 percent, and naphthenic base oil distillate, 67 percent."
A. Right.
Q. And where are you getting that from?
A. I'd have to go back into my files. I think I -- it's either from a safety data sheet or from some, you know, possibly correspondence that I have in the record about the composition of this product.
Q. Sure. And I'll -- I'll represent to you we received a Dropbox earlier today, and it had two Material Safety Data Sheets for Marvel Mystery Oil contained in it.
Do you know if you used two separate data sheets for Marvel Mystery Oil?
A. I did, and -- and it is, kind of, coming back to me now. As I recall, the -- the first one, the one from 1985 really was pretty sparse. You know, there wasn't really very much information

contained in that, other than what I've presented here.
And, then, the one from 1995 and, then, these others that I mentioned for, you know, later dates had a lot more detail.
Q. Do you know if you pulled those Material Safety Data Sheets, or if you were provided those sheets?
A. I think they were provided.
Q. And, then, same thing: Paragraph 3 on page 29, in that second sentence, is that coming from a Material Safety Data Sheet as well?
A. It is, yeah.
Q. Same thing with the -- the next sentence. Would that be from your review of safety data sheets?
A. Right, those are.
Q. Okay. And, then, there's the next sentence: "In the time period when Mr. Rhyne used this product at Catawba --" from 1986 to 1998 "-- the benzene contents of the petroleum derived solvents reportedly ranged from 100 to 2,000 --" parts per million.
And where is that coming from?
A. Oh, what I was reflecting there -- and I

think, you know, probably the -- the underlying source there is that review article that Williams prepared --
Q. Uh-huh.
A. -- because in her supplementary tables she has a variety of products over time.
Q. Uh-huh.
A. And so among these mineral spirits or petroleum distillate products, that was the range that she reported going over this, you know, 20-year time period.
Q. Okay. And, then, it looks like the last sentence says when you determined that the range of Rhyne's benzene exposures from Marvel Mystery Oil "-- to be .01 to 1 parts per million with a midrange value of .5 parts per million for the duration of each use," and how did you come up with that calculation?
A. Yeah. That actually would have been what I -- you know, again, that's -- that's based on the range of exposures that Williams had reported for the materials that ranged from 100 to 2,000 parts per million.
So, again, that -- and that's from the supplementary table No. 1 in her report.

Q. Okay.
A. But, you know, since I later decided that I really just didn't feel comfortable trying to determine the exposure level, I really should have taken that last sentence out.
Q. So sitting here today you believe you should have taken the last sentence out of paragraph 3 on page 29 out of the report?
A. Well, reflecting on, you know, as I really tried to think about, you know, both the potential content of benzene in the material, but also what I concluded or inferred about the way he was using it, I really didn't feel that there was a substantial opportunity for him to have exposure.
So that that's why I gave it this category as "Not determined."
Q. As far as any benzene that would be contained in Marvel Mystery Oil, would that be coming from the mineral spirits only?
A. Well, in some --
MR. DuPONT: Objection. Form.
THE WITNESS: I'm sorry.
A. No, some of these, you know, ingredients that are listed, say, like, in -- in 1985, you know, we have the "mineral oil petroleum distillate

solvent dewax severe," I mean, they're, you know, "heavy naphthenic petroleum lubrication oil," you know, so there's a range of, I mean, ingredients there that could potentially contain benzene.
Q. And can you just go over which ingredients you believe --
A. Well, I think, you know, you clearly could have had from -- from the petroleum distillate solvent refined the heavy naphthenic petroleum lube oil, the Stoddard Solvent mineral spirits. I mean, I think those three would be candidates.
Q. And you did not perform any product testing on Marvel Mystery Oil; is that correct?
A. No, I haven't.
Q. And you haven't provided any opinion regarding dermal exposure to Marvel Mystery Oil.
MR. DuPONT: Objection. Form.
A. No.
MS. WOOTEN: Doctor Herrick, I believe that is all the questions I have for you right now. Thank you.
MR. DuPONT: It's been about an hour. Take a quick break.
(Recess was taken.)
EXAMINATION

BY MR. JEFFRIES:
Q. All right. Good evening, Doctor Herrick. My name is John Jeffries. I represent Kano Laboratories in this case. They manufacture a product called Kroil Oil.
Are you familiar with Kroil Oil?
A. I am now, yeah.
Q. When did you first familiarize yourself with this product?
A. It was when I started reading the depositions from Mr. Rhyne.
Q. Okay. And I take it, then, you had never analyzed or studied or tested or evaluated Kroil Oil in the context of any other similar situation in the past?
A. No, I haven't.
Q. Okay. Are all of the conclusions and opinions you anticipate expressing in this case with regard to this particular product contained with your report?
A. They are.
MR. DuPONT: Objection. Form.
Q. Do you anticipate any further testing, analysis, or modeling beyond that that's been done and included in your report with respect to the

Kroil Oil product?
A. No, I don't.
Q. All right. Is there any further testing or modeling you'd like to do that you think would assist in your evaluation of them?
A. I don't think so. I mean, I'm just trying to, kind of, visualize the way he described that he used it and -- and what I know about the composition.
I mean, I suppose the only thing that, you know, would be useful would be if there were safety data sheets or -- or product composition information going back to 1990.
Q. What about, like, any prior testing of the product?
A. That could -- that could be useful too, sure.
Q. Has that been provided to you?
A. Well, what I have is the expert's report from -- is her name Deeds?
Q. Yes, sir.
A. Yeah. And so I -- I've seen that. And, then, I've also seen the Certificates of Analysis from archive samples --
Q. Yes, sir.

A. -- some information that -- but I got all that after the report had been written, so you don't see it reflected in here.
Q. All right. And was there anything about that material that changed your evaluation or your assessment about the benzene content in this product?
A. Well, you know, I mean, it's -- it's a good question. I -- I read the discussion, and I guess I read her deposition, is it? Her -- no, I read her review -- her comments on -- on my report. I saw that.
Q. Yes, sir.
A. And, then, I also saw the deposition of someone whose name I'm going to blank on -- gosh. Come on. Help me out here. The guy from Kano.
Q. Mr. Zimmerman?
A. Zimmerman. Thank you.
Q. Yeah.
A. So I saw his deposition too.
Q. And when were those materials provided to you?
A. I think I just saw those last week.
Q. Is it fair to say that all the material you've reviewed in the case -- other than the

academic articles and the materials you actually produced, is it fair to say all these materials came from Mr. DuPont's office?
A. I think that is fair to say, yeah.
Q. So you haven't reviewed anything from any outside sources other than these academic studies that you've studied?
A. On -- on this product, you mean, the particular --
Q. Yes, sir.
A. No, that's -- that's pretty much the extent of it.
Q. Okay. And, again, not having had the prior testimony when you did your assessment, is it fair to say that you made some assumptions and -- and looked at some more general information, as opposed to specific testing of the Kroil Oil product?
MR. DuPONT: Object to form.
A. Yeah, as of the time that I wrote it, I really didn't have specific testing results from this product, and what I, you know, wound up using was largely this information from the 2005 Material Safety Data Sheet.
Q. Okay. And then assessed that in the

context of -- I think you've referenced the 2008 Williams study; correct?
A. Where she talked -- yes, where she talked about the range of benzene in various products.
Q. Is it fair to say that's a more general assessment, as opposed to a specific assessment of data on this product?
MR. DuPONT: Object to form.
A. You mean her overall --
Q. Yes.
A. -- approach?
Yeah, I mean, she was looking at the whole family of petroleum-based products.
Q. Okay. And that encompasses a wide range of products with wildly varying compositions and ingredient lists and things of that nature; correct?
MR. DuPONT: Compound. Form.
A. True, yeah, although I will say, you know, she -- she organized it in a way that you can, you know, see specific characteristics. But, yeah, it's -- it's a very wide-ranging survey.
Q. Okay. And, again, I'm trying to streamline things. I know we've all been here longer than we thought we would, but the -- your

report suggests that you're assessing Mr. Rhyne's use of this product sometime between the early 1990s and 1998; correct?
A. That's right, yeah.
Q. Okay. And, then, again, just to streamline and clarify: This is the only time period that you've evaluated his use of the Kroil product.
A. It is, that's right.
Q. Okay. Do you know what form he used this product in?
MR. DuPONT: Form.
A. You're thinking of, like, as a liquid or an aerosol?
Q. Liquid, aerosol, or gel or what -- what --
A. My -- I'm trying to recall how that was discussed. I think it was a liquid that he used as -- as a penetrant.
Q. Okay. That's a fairly significant aspect of the analysis; right?
A. Well, it would be, although, you know, most of the information that's out there around these cross-penetrant materials, you know, does tend to be on the liquids.
Q. Okay. Well, I mean -- and, again, I'm

just trying to understand the perspective from which you evaluated it.
Did you assume it was a liquid?
Do you -- do you have information in your report to suggest to you the form he used it?
A. As I recall -- and I don't have the safety data sheet here with me, or, you know, like, readily accessible, but, you know, frequent -- well, I would say, you know, in general, if it is in the form of some kind of an aerosol, there's an ingredient listed as a propellant, and I don't recall there being any propellant mentioned in that safety data sheet. So that would lead me to conclude it's a liquid.
Q. All right. And do you know how it was sold or distributed? In bulk? In bottles? In drums?
A. I really don't.
Q. Do you know how Duke Energy purchased it in the 1990s?
A. I don't.
Q. Okay. Do you recall how Mr. Rhyne described the product's appearance?
A. I -- sitting here right now, I really can't remember how -- what he said about it.

Q. No recollection of color? Viscosity? Type of packaging?
A. I remember some of these materials, you know, he mentioned where it was, like, kind of a red solution or red liquid. You know, I'm -- I'm not really recalling that particular detail for this product.
MR. DuPONT: Compound.
Q. And did you ever determine whether or not his description was accurate?
A. No, I didn't.
Q. What was Kroil used for in the 1990s?
A. Well, my recollection was this was when he was breaking these ice vibrators apart, and he described that the process was, you know, they had to use, like, a bar and -- and these things were you know, difficult to -- to break loose.
And so my impression of the way he used this, you know, was as a -- a penetrant to help release the -- the fastening -- the nut and the bolt, I suppose -- that were holding these vibrators together.
Q. Okay. Is that what -- was it a nut and a bolt? Was it a bar? A flange? I mean, what was it?

MR. DuPONT: Form.
A. I -- you know, that's a good question. I mean, he talked about using a bar to help break the -- break this part, you know, to get it to move. So I -- I assumed it was some kind of a nut, at least.
Q. Okay. Did you ever perform any investigation or seek any additional information to clarify that point?
MR. DuPONT: Form.
A. No, I didn't.
Q. Okay. Would it be important to know precisely how the material was being used so that you could evaluate the volume of material used, how it might be applied, how it might -- how the -- the worker may come into contact with it?
MR. DuPONT: Form.
A. Well, I think what he described -- I mean, that information is helpful. I mean, what -- what's actually, I think, more useful for me was the way he described, you know, the -- the length of time per day. So that when he was doing some of these jobs, you know, he would spend the entire 10-hour day using the product to break these parts so he could disassemble this vibrator.

Q. Yeah, I understand that, and I think it's important to talk about that, because what part of the day is he actually using the product? I mean, you've described it as a rust penetrant. I'm assuming that it's not constantly poured on a -- a part or a machine. It's applied and then given some time to work or used in some other way.
Did you familiarize yourself with that?
MR. DuPONT: Compound.
A. Well, no, I -- I really didn't. You know, and, as you describe it, you know, it -- what had occurred to me was that it reminds me of the approach that people use with Liquid Wrench, where they do, you know, exactly what you described: You apply it to the part, let it sit for some short period of time, see if that has allowed the part to release; if it doesn't, the penetrant is reapplied.
You know, sometimes you rap it with a tool to see if that helps break everything loose, and -- and so it's the, kind of, a repeat process of applying it, letting it sit, and then trying to to free the part.
Q. You never made any information -- never made any attempt to clarify that information with Mr. Rhyne; is that right?

A. No, I didn't.
Q. And just to be clear, I mean, we've heard this answer a lot from you today, that you don't know, or you don't remember, or you don't have access to information.
Mr. Rhyne's attorney hired you to testify in this case; correct?
MR. DuPONT: Compound.
A. That's true, yeah.
Q. To offer opinions about his various exposures or alleged exposures to this whole host of products; correct?
A. That's correct, yeah.
Q. Mr. Rhyne and his lawyer, your client, so to speak, in this endeavor; right?
A. I'm sorry. Could you repeat that.
Q. His lawyer and -- Mr. Rhyne and his lawyer are your clients in terms of your role in this case; correct? And you're doing work for them, you're sending them bills, you're collecting payment from them; correct?
MR. DuPONT: Compound.
A. Well, that's true, yeah.
Q. Okay. So is there any reason why you, if you needed this information to understand how long

he had to apply the Kroil, how long he had to wait between applications, things of that nature -- is there any reason you couldn't have contacted Mr. Rhyne to obtain that information?
A. Well, I could have, you know, called and -- and, you know, asked for some more specific information. What I was mainly interested in from him was the -- or on this particular application was the length of time that he used the material over the course of the day.
Q. But we don't know that; right? I mean, the bottle may have been sitting on the table for a 10-hour day, but he may have used it for 8 minutes; right?
I mean, do we know?
MR. DuPONT: Form. Compound.
A. You know, I'm trying to recall, you know and I don't have his deposition right here in front of me, of course, but, you know, I think he used words like, You know, I used Kroil for the entire 10-hour day. You know, I think that's in my report, and I think that came straight from his deposition.
So, you know, I didn't think it was unreasonable to say, Well, he was using this, you

know, over the course of the workday. I didn't have any -- any more detailed information about how many times per hour he applied it, or if he applied it once and then it sat on -- on the counter, you know, for the rest of the time.
Q. And, I guess, how do you understand how to make the approximations you made in using the -- the computer system simulator that you used and the program that you used to calculate these exposures without knowing that?
MR. DuPONT: Form.
A. Well, you know, in this case I didn't really use, you know, any of the modeling for -- for this. I used this value that -- these values -- this range that I talked about that I derive from the Williams data.
So I took that as the exposure that was prevalent throughout that 10-hour work period.
Q. Okay. So you didn't use any of the computer modeling in your assessment of Kroil.
A. I did not, no.
Q. Okay. All right. And we'll talk about more in a minute how that was done.
What understanding do you have about this work he was doing -- what -- what's your

understanding of the -- his job duties as a technician at the Catawba plant between 1991 and 1998?
A. Well, this was one of the responsibilities that he had during the outages. And so he did other tasks, you know, during that time period when they weren't doing this maintenance, this -- this outage work that involved the use of Kroil.
And so, you know, I think I tried to address that in my report what his, you know, kind of, scope of duties and responsibilities were during other time periods.
And, then, I think this was also the time period when -- wasn't he detailed temporarily to some of the other plants where he would, you know, work on the maintenance activities too? This was part of his overall responsibilities as a pipefitter.
Q. Okay. Yeah, I understand.
And, again, since you're talking about or assuming that he is only using Kroil during the outage work, but I'm trying to determine is your understanding of what percentage of his time during that employment did that involve?
A. Oh, I see your point.

Well -- and that's one of the things that, when we get to the data, I can, you know, point out that I, you know, when I did the calculation, I -- I incorrectly assigned that he was exposed over that entire seven-year period. And I realized later that that was incorrect.

And so, based on the number of outages that he worked on and the typical duration of the outages, I recalculated his cumulative exposures to reflect just the period of time he was spending doing the outage.

Q. Okay. But that's not reflected in your report.

A. No, I --

Q. That's a separate calculation you've done?

A. I did, and I revised his cumulative exposure table to reflect that; correct.

Q. Did you just do that today?

A. No, I did this last week.

Q. Oh. Can I see --

A. Sure. I just brought it -- I brought it for you guys for today. But those handwritten numbers reflect his -- his corrected cumulative exposures.

Q. Okay. And this is, kind of, a reworking

of Table 4, which is on page 43 of your report; correct?

A. Right, yeah.

MR. CAIRONE: Off the record.

(Exhibit Herrick 12, one-page document: Table 4, "Cumulative Benzene Exposure by Product and Facility update".)

Q. All right. Doctor Herrick, so you're -- while we were off the record I marked as Exhibit 12 the revised Table 4 that you gave me, and you had you suggested that you had miscalculated your quantification or your -- your assessment of the cumulative exposure to benzene as a result of Kroil, because you had assumed that he -- Mr. Rhyne -- used that over his entire seven-year work period at the Catawba plant, and you've revised that to suggest now he only used it during these outages.

A. That is correct, yeah.

Q. And I think he described it in his deposition as doing preventative maintenance work during the outages? That's why they would shut the plants down?

A. That was, kind of, my understanding, and there was a lengthy discussion about these ice condenser devices that -- that he had to empty and

-- and, you know, replace and all; and that taking these vibrators off was part of that whole maintenance process.

Q. All right. And did you calculate or -- or record in your assessment how many of these outages took place during the period of his employment at the Catawba plant?

A. In his deposition he estimated -- 'cause someone asked him this -- he estimated that he had done -- I think he said 15 or 16 of these outages.

Q. And I think that's right.

And I think that he also estimated that he would -- that was -- essentially an outage would essentially take a workweek; right?

A. That sounds about right, because it took him -- he said he could do maybe 15 of these a day, and there were 70 of these vibrators.

So that -- that would work out to be about a full week.

Q. So is it your understanding, then, that his view -- the maximum amount that he has described using this product, this Kroil product, is for a 15- to 16-week period over a seven-year -- seven- to eight-year employment time frame; correct?

A. That's correct, yeah.

Q. Okay. I think I did the math. That comes out to about 5 percent?

A. That's about what I came up too is 4-point-something percent of his time.

Q. Okay. And, again, this is important, I think, to talk a little bit about how he used the product itself, and, then, you said he may have used it as a loosening agent for -- for nuts and bolts.

Are you familiar or aware of any other methods in which he used it?

A. I don't remember, 'cause I -- that I think came up in the deposition; and -- and, as I recall, he had a very specific application for this product and it was to -- to free up these -- these vibrators in this maintenance activity.

Q. And you haven't obtained any more specific information on that; correct?

MR. DuPONT: Objection to form.

A. No, I haven't.

Q. Do you know what it means to break up an ice condenser?

A. I think that was, kind of, the general process that he referred to, because once he took

these vibrators off, then there was -- there were these long, sort of, baskets or cages of some sort that were, what, 48 feet tall, or something like that; and that they, you know, had to empty these out, and -- and weigh the contents, and then there was a reassembly step.

Q. Was it your understanding that these were fairly big pieces of equipment?

A. Yeah, sounds like it. I've never -- you know, I don't recall ever seeing one, but they -- I think the number 48-feet long sticks in my mind. So, yeah, they were big.

Q. And he described his working in the reactor buildings and the auxiliary building and the turbine building as fairly large structures; correct?

MR. DuPONT: Form. Compound.

A. Yes, yes.

Q. There were some questions earlier about 4 stories high and 100 feet high and things like that. These are large, open spaces to house this large equipment; correct?

MR. DuPONT: Compound.

A. It's full of large equipment, yeah.

Q. Okay. And did you obtain any specific

information about any kind of ventilation or exhaust system in these facilities?

A. I don't have anything beyond, you know, kind of, a -- a sense that they had, you know, good natural ventilation throughout the building, but I didn't -- I didn't recall seeing anything in there that would, you know, specify anything beyond that.

Q. You mentioned having experienced touring or evaluating nuclear power facilities in the -- here in this area in Connecticut; correct?

A. That's true, yes.

Q. Did those facilities have ventilation systems or forced air systems or -- as a safety precaution for, you know, protection from radiation exposures or leaks or anything like that, or...

MR. DuPONT: Compound.

A. Yeah, and it depended a lot on the area of the plant, because some of it is in what they call the "containment area," and, then, there's other parts of the plant that are just, you know, sort of, the general plant and the control facilities and things like that.

So, I mean, my short answer would be: Yes, but it was very area-specific.

Q. And Mr. Rhyne described working in these

containment-type areas; right? He -- he described working in areas with ventilation and air control, air monitoring systems; right?

MR. DuPONT: Compound.

A. Well, he did, yeah, especially, you know, 'cause as I know you're aware, some of his work was done in -- in the construction phase --

Q. Right.

A. -- and then there was other work that he did when the plant was actually operational.

Q. Right. But this preventative maintenance work is once the plants is operational and these systems would be in place.

MR. DuPONT: Compound.

A. That's correct, yeah.

Q. You didn't have a different understanding, did you?

MR. DuPONT: Compound.

A. No, that -- that's similar to the way it seemed like he described it.

Q. Okay. And is that a factor in terms of his exposure? If he's using a -- a product that he's exposed to -- to vapors emitted from the product in an area where there's a ventilation system, does that impact the nature and extent and

magnitude of his exposure?

MR. DuPONT: Compound.

You're -- you went from air monitoring devices to now saying, "air ventilation."

Q. I should say air -- air monitoring.

And, again, I apologize. I'm not terribly familiar with how these systems work in a nuclear power plant. I know about as much as Homer Simpson does, I guess.

But at any rate, the -- there's some system in there to control the ventilation and the airflow in the event of contamination or leak or other hazards; correct?

MR. DuPONT: Compound. Lacks foundation.

A. Yeah, there is, you know, especially if there's, you know, some kind of an upset condition or some sort of emergency, there's a lot of layers of protection and ventilation.

I guess the -- the thought I had in terms of this particular set of tasks he was doing was that, you know, these were done during outage periods; and so the plant really wasn't running. You know, it wasn't up and functioning.

So some of these ventilation systems that might have been in place at other times were

possibly not functional when he was doing the maintenance.
Q. Okay. But that -- you didn't confirm that. That was an assumption you made.
A. Yeah, that's kind of my -- my sense of how this would have been done, but I -- I didn't confirm it, no.
Q. All right. Other than breaking apart the ice condensers, are you aware of any other area in which he use the Kroil product?
A. I really don't. I mean, I remember in the deposition there was discussion about, you know, how he used it, and my recollection was that that was pretty much the -- the dedicated application for this product.
Q. And your understanding was that it was a liquid?
A. Well, looking at the safety data sheet, you know, I mean -- and I'm trying to remember if that specifically came up in a deposition, and I don't remember -- but, you know, I'm inferring from the fact that there wasn't any propellant listed in the safety data sheet that it was a liquid.
Q. All right. And how was it applied, if you know?

MR. DuPONT: Form. Asked and answered.
A. You know, again, I'm trying to remember how he -- if he -- if that really came up, or how he described the process.
I don't remember him really getting into a lot of detail or -- or him being asked exactly how he applied it.
Q. Do you know whether it was applied on the external portion of the machine, or whether it was used on interior parts as well?
A. Well, I'm, sort of, visualizing, you know, how he had to open up this -- this vibrator to get at these parts, and so my expectation would be that it was pretty much an external application to this nut or bolt that he was trying to -- to free so he could remove the vibrator.
Q. But, again, that's an assumption you're making; correct?
A. Yeah, it didn't really come up, you know, specifically in -- in his deposition.
Q. Okay. And do you have any specific information about the length of time that the product would be applied in the course of attempting to break apart one of these vibrators or ice baskets or ice condensers?

A. I'm -- you know, just, kind of, back-calculating from the way he described the work process: If he worked at this for, say, 10 hours a day, and on a good day I think he said they could do 15 of these -- you know, my sense is this -- you know, this was a difficult job; and so there was, you know, a lot of time, you know, spent trying to -- to get this part freed, and so the -- the Kroil was being used throughout that period.
Q. Do you know how much time it took the Kroil to "operate" to perform its intended function?
A. You know, I really don't. I mean, if it's -- if it's anything like the work cycle around some of the Liquid Wrench projects, you know, it's -- it wouldn't be unusual that there would be repeated applications.
Q. But, again, you didn't review any kind of instructions or -- or labeling of the product to verify that; correct?
A. No, I didn't.
Q. All right. And no specific information from Mr. Rhyne about how many applications he may do in a given day; correct?
A. You know, he -- I don't think he was asked

that, and he didn't -- didn't recall it or didn't bring it up.
Q. And you have not -- I think it was asked by one of the other attorneys -- you have not visited this plant or any -- or any of the three plants that he indicated working at during the '90s; correct?
A. That's correct.
Q. Have you seen any schematics or sketches or photographs of the buildings?
A. Short of his handwritten drawings that are there as exhibits, that was pretty much it.
Q. What you did see, did you find it to be comparable to the facilities you'd seen in Connecticut in your other projects?
A. It generally is. You know, it's -- it's that, you know, sort of, characteristic design of nuclear plants that were built during that era.
Q. Okay.
A. So I'd say, yeah, you know, at a 30,000-foot level, sure.
Q. Okay. During these outages do you know what percentage of time he would have spent breaking down these vibrators, versus doing other tasks?

A. I got the impression that this was really his primary task; that this was where, you know, he was really spending -- because they -- you know, they -- the whole outage is a pretty intense event. They want to get the plant back online.

And so, you know, my impression from the way he described it was that, you know, he -- he could have, you know, been working on -- on that task for the entire -- for -- well, let me -- I'm sorry.

Let me correct that, because part of it was he had the disassembly process, which was when he was using Kroil, but, then, there was a reassembly process, which I think, if I remember correctly, was about a third as long or something; it was a lot faster to put stuff back together than it was to take it apart.

Q. Right.

A. So in the total outage period, you know, there was a portion of that time when he was reassembling things, not when he was doing the disassembly.

Q. And you agree with me that the -- the lubricant would not be used for the reassembly, or would not be necessary.

Is that your understanding?

A. I -- I think that would be a reasonable expectation. You know, there wouldn't necessarily be a reason to use it when you are putting stuff back together.

Q. And I -- I appreciate what you said about the -- the taking down the equipment and taking more time and so forth, but Mr. Rhyne described this as doing preventative maintenance. So, I mean, it wasn't simply just taking it apart and putting it back together; right?

A. Right.

Q. There was -- did you assume there was something they were doing to the equipment once they had it disassembled?

A. Yeah, I think that, you know, I hadn't really thought about particularly what it would have been, but I can imagine that, you know, they had to verify that these baskets were structurally intact and that they were in good working condition before they did the reassembly.

I mean, that's, kind of, the way, you know, things would run in a nuclear environment; that things had to be right.

Q. At some period of time they'd have to fix

or replace anything that wasn't up to standard; correct?

MR. DuPONT: Form.

A. I would think that would be true, and there's probably some inspection steps involved in there.

Q. Okay. So even assuming, as you did, that the disassembly process took the majority of the time, you would agree with me, wouldn't you, that there were other aspects of this particular job he was doing during which he would not be using a product like Kroil?

A. Well, I think that's fair to say, 'cause there would be the -- the reassembly process and -- and whatever else if there was inspection involved.

Q. Okay. And even in your recalculations of the cumulative exposure, you -- you still assumed -- at least for those 40- to 50-hour weeks -- 100 percent of the times using Kroil; correct?

A. Yeah, I did. That would --

Q. So you --

A. -- within the day that he was using it, yeah.

Q. So the adjustments you made was to -- as opposed to assuming that he used Kroil for every

day he was employed in that job, you adjusted it to account for the fact that he only may have used this product during these outages.

A. Right, roughly 5 percent of his -- of his time over that 7- or 8-year period.

Q. And that was my next question: About 4 to 5 percent of his time?

A. That's the number that I wound up using, yeah.

Q. But of that 4 to 5 percent, you did not make any adjustment to account for the fact that some of the time would have been spent on reassembly, some of the time would have been spent on preventative maintenance, and those tasks likely did not involve the use of a lubricant or a product like Kroil; is that fair?

A. Yeah, I think that's fair to say. There were other things going on.

Q. So it may be that even these revised estimates are a bit high, given that at least a third to a half of his time may have been spent doing jobs that did not involve the use of this product.

MR. DuPONT: Objection. Form. Compound.

A. Yeah, I mean -- and I could -- I could

take a look back, you know, in his deposition, 'cause, as I say, somehow I have it in my mind that he -- he seemed to, I think, say the reassembly took about a third of the time of the disassembly.
Q. And in your defense, I think he only talked about it for about six pages. So it's -- the fact that you recall as much as you do is to your credit. I appreciate that.
All right. So let's -- I think that clarifies a lot of what I wanted to talk with you about in terms of his actual work.
Let's -- let's talk about how you arrived at these figures. So how does -- how does the process start when you were evaluating this daily exposure and cumulative exposure?
Kind of -- kind of walk me through that.
A. Well, in the -- in this particular case --
Q. Right, and as it relates to Kroil, sure.
I'm sorry. I didn't ask a very good question.
A. Well, it kind of starts with trying to see what I can learn about the composition of the products that he was, you know, running into when he used Kroil. And so that leads me back to the safety data sheet in this case, as I didn't have,

you know, any of the other information that we just talked about earlier.
So there, you know, you can -- and in this case, based on the content of the materials that he was using from the safety data sheet, I went back and -- and, you know, used the information from the published literature, in particular that Williams paper that we've talked about about what levels of exposure were associated with products that were in use, say, from about -- I think she spoke from about the '70s to 2000, over that time period -- what was the range of benzene content of those products.
And so that's how I matched up and said, okay, well, for the range that I'm going to use for him, is -- we'll say it's somewhere between 100 -- let me just make sure I give you the right values here -- (witness reviews document) -- that the range over those years was from 100 to 2,000 parts per million; and the one-hour average -- average exposures that were associated with that ranged from .01 to 1 parts per million. And -- and that's -- and so the midrange of that is .5.
Q. Okay.
A. So that's how that number comes to be.

Q. And those -- those are figures you derived from looking at the listing of items in the Material Safety Data Sheet --
MR. DuPONT: Objection --
Q. -- and then assessing that prior study.
MR. DuPONT: Objection to form.
A. Right, I mean, 'cause we knew the ingredients that were present, at least in -- as of 2005 -- that were present in Kroil.
Q. So, I mean, not to oversimplify things, but tell me, what is the Material Safety Data Sheet?
A. Oh, well, it's a document that's produced really in compliance with the hazard communication standard, and so the manufacturers, industry readers, you know, use this as a means of communicating information to the people who use the product.
Q. All right. And what is typically contained on the Material Safety Data Sheet?
A. Well, that's a good question, because, you know, over the years and -- and between companies, it varies all over the place. And I've seen some that, you know, look like they were written by the corporate toxicologist, because they've got, you

know, elaborate detail about the results of animal studies, and, then, there's others that are -- that are really sparse.
But, you know, for the most part they have information about the -- the composition -- you know, the ingredients, the fire safety, hazard information for poison control centers, information about acute and chronic toxicity, and that -- and this kind of variable.
The more recent ones have information about how these chemicals are classified by states like California and by EPA and by other organizations that, you know, do different kind of ratings around hazards.
They have information in there about firefighting, about emergency response, about spill response. That kind of thing.
Q. Okay. With regard to the -- the content -- well, since you, kind of, suggested there's, kind of, a spectrum, do you have a specific recollection -- with regard to this MSDS sheet you reviewed for Kroil -- whether it was specific or general?
MR. DuPONT: Form.
A. You know, just sitting here right now, I

am not getting a good recollection of that --
Q. Okay.
A. -- particular one.
Q. And it looks like you outlined some of the contents on page 29 of your report; is that -- I think that's where you're discussing this.
A. Right. That's --
Q. First full paragraph.
A. Yeah, I tried to summarize what was identified from that 2005 safety data sheet.
Q. Okay. Can you go through with me what some of these items are that are on the -- "Hydrotreated Petroleum Distillates," what does that refer to?
A. Yeah. Well, that's one of the things -- you know, we kind of talked about that earlier today. It's one of the petroleum-based materials that's been further processed to try to reduce the content of the aromatic fraction, in particular benzene. And so that's present at about 30 to to 50 percent. The "Light Petroleum Distillates," you know, that's, kind of, a family of materials; you see there's like three different CAS numbers listed there, and that -- you know, that's just one of the fractions from the refining process. You know, it

hasn't really been processed further, but it -- you know, the light refers to the molecular weight and the boiling range of those particular --
Q. Okay.
A. -- of that fraction. Naphthenic alcohols -- like all ethers -- you know, those are -- you know, two families of compounds that are, you know, I'm imagining are added, you know, for the performance of the -- of the final product, and, then, 5 to 15 percent of it is identified as proprietary.
Q. All right. So, I mean, that -- I can't take this and make a batch of Kroil Oil; right? It's not a very specific --
A. Right --
Q. -- accounting of what's in there; right?
A. Right.
Q. And, again, you mentioned earlier, having reviewed the report of Ms. Deeds, a couple of statements she made, and I want to see if you agree with these.
Would you agree that these individual ingredients referred to as petroleum base oil, petroleum solvent, petroleum naphtha are actually complex mixtures derived from the cracking and

refining of crude oil?
A. I think that's a fair characterization, yeah.
Q. Okay. And would you agree that these are not pure chemical substances?
A. I would agree with that, yeah.
Q. All right. And these CAS numbers that are assigned to petroleum distillates, is it fair to say or is it accurate that the CAS number is based upon the refining process and not necessarily the chemical composition of the substance?
MR. DuPONT: Compound. Vague.
A. I don't -- it's a good question. I don't really know. You know, as opposed to, you know, like the CAS number for benzene refers to, you know, the particular molecule.
Q. Uh-huh.
A. You know, I'd have to say I don't quite know how they decide, you know, how to assign these CAS numbers to these variable mixtures.
Q. Okay. Is it true the products with the same CAS number may be very different in terms of their chemical composition?
MR. DuPONT: Form. Vague.
A. Sure. I mean, I think if you did the

detailed chemistry around light petroleum distillates, you know, that you could easily see within the same CAS number there could be a lot of variability in their individual chemistry.
Q. Is that true with regard to benzene content as well?
MR. DuPONT: Form. Vague.
A. Well, I think it -- it, you know, would be fair to apply that to the overall content, you know, to only one of the ingredients in the mixture.
Q. Okay. So it's understood, I guess, within your field that these are general descriptions of a wide range of products. You referred to them as a family of products, correct, or --
MR. DuPONT: Form. Vague.
Q. -- or substances.
MR. DuPONT: Form. Vague.
A. Yeah, I think, you know, considering it to be a family or a group of related compounds is a -- is an accurate way to look at it.
Q. All right. And it's impossible, isn't it, to identify specifically the benzene content of a particular substance based on the use of these general descriptors in the MSDS sheets; is that

accurate?
MR. DuPONT: That's so vague. And misrepresentation.
MR. JEFFRIES: Just "objection" will be fine.
MR. DuPONT: Come on.
A. Well, I think that's why you see in the literature, you know, people tend to report ranges. You know, across a category of compounds they report a range of benzene contents, because, you know, unless there is some individual analysis to go on, a range is a better way to -- to try to capture, you know, the true number that's in there somewhere.
Q. Would you agree that in situations where there is an individual analysis, that is the better dataset to use?
MR. DuPONT: Form.
A. If -- if you have, you know, a good, sort of, linkage, you know, of -- of the information to the specific product that's in question, if you have analysis like that, it's -- it's definitely something to be used.
Q. Okay. And, again, your numbers of the 100 to 2,000 part per million is based upon the

Williams study that suggests that the range of benzene content in these types of substances is anywhere from 1/100th of a percent to 2/10ths of a percent.
A. Yeah, that's what's in that 2008 paper.
Q. Okay. All right. So without specific testing, without specific data you start with this range.
What's the next step in the process?
A. Well, that's why I tried to, you know, say, Okay, Well, here's -- here's a range. What's the midpoint of the range.
Q. Okay.
A. And that's how I wound up with this value of .5. That's the -- the middle of this range that we're looking at here. And so when I did the calculations, you know, I -- I tried to capture the high end of the distribution, the low end of the distribution, and the value that's in the middle.
Q. Okay. And that midpoint, I mean, that -- you calculate the midpoint, but, again, that's still an assumption; correct?
A. Yeah well.
MR. DuPONT: Form.
A. Just trying to, you know, put a bracket

around it and say, Okay, well this is the -- these are the extreme values. What's in the middle?
Q. Right. But the actual -- you know, the actual data may be somewhere far to one end of the spectrum or far to the other end; correct?
MR. DuPONT: Form.
A. Well, yeah, and that's -- you know, that's why I'm trying to be, you know, circumspect about you know, kind of, the uncertainty by reporting the -- the range the way I did.
Q. Right. I understand. And, again, not to oversimplify it, but if the range is 1 to 100, 50 is the midpoint, but the actual number may be 12, right? Or 92 --
A. It could.
Q. -- right? Okay.
A. Yeah.
Q. And without specific testing all we can do is make the approximation and use the range.
A. That's kind of the approach I took, yeah.
Q. Okay. All right.
So that calculation gets you to a daily exposure level which you initially put at .5 ppm.
A. That would be the value in the middle; right.

Q. Okay. All right.
Now that you have established that, what is the next step in your analysis?
A. Well, so you've got, say, like the kind of information that's in Table 3, so -- which is what you see, you know, the -- the range and the midpoint of the range; and, then, to get from that to Table 4, you -- I would take the duration of time that -- that he was exposed at that level, and then multiply duration by the daily average to get the cumulative exposure.
Q. Okay. All right.
And I want to go through that process and the new numbers, but I think another one of the lawyers asked you if you -- obviously, if you used these values on the lower end of the spectrum, your daily cumulative -- your daily and cumulative exposures are going to be much reduced; correct?
MR. DuPONT: Form.
A. I'm sorry. Could you repeat the --
Q. If you used the estimated benzene content on the lower end of the spectrum, then your daily and cumulative exposure levels will be reduced well below that midpoint; correct?
MR. DuPONT: Form.

A. Right.
Q. And conversely if you use the values on the high end of the spectrum, then the -- the daily and cumulative totals will be elevated.
A. Correct. Yeah.
Q. All right. If I used 10 parts per million versus 100 parts per million, the -- the exposure will be less by a factor of 10; right?
MR. DuPONT: Form.
A. Yeah, that's -- that's a --
Q. That's just simple math at that point.
A. -- an approximation. Yeah. Sure. Right.
Q. Okay. So how do we get the daily exposure figures -- or the new figures, I guess?
We might only have one of these, so we might have to share.
A. Though the daily didn't change, but what changed was the cumulative.
Q. I'm sorry. Cumulative. Yes, sir. My apologies.
A. So what I did was I adjusted his duration values so that instead of using that whole seven-year period as his period of exposure, I -- I downsized that. It was, I think, by a factor to make it about five percent of his time during that

seven-year period when he was actually exposed.
So the calculation that would be on the spreadsheet is the product of his daily average times the years. And so instead of seven years, it's, I think, about .035 years.
Q. Okay. And so that's reflected here in Exhibit 12.
A. That's the -- yeah, that's the result of doing that calculation with the correct duration value.
Q. And the revised assessments you had for Kroil is -- I'm sorry. There's a mark there.
Is that 10.02 or .02?
A. Sorry. That -- I probably should have done -- that's just meant to divide that cell into two parts.
Q. Okay. Okay.
A. So it's 0.02.
Q. Okay. So that's the cumulative exposure and the midpoint of the cumulative exposure in ppm-years.
A. That's right.
Q. All right. And, then, so that comes from a range of .004 to .04 for the cumulative range; correct?

A. That's correct, yeah.
Q. All right. And are there any other changes to the totals -- well, explain to me on the bottom here under "Total." Why are there three separate calculations?
A. Oh, what I tried to do was capture -- you know, if you think about the kind of range of scenarios that he had, you know, and -- and the things that were, you know, his major uses -- the Liquid Wrench, he had three different benzene concentrations in Liquid Wrench; and then, in the CRC products, I, you know, calculated it for two different levels of benzene.
And so what I tried to, kind of, collapse overall here is as low, medium, and high, would be -- low would be at the lowest benzene in Liquid Wrench and the lowest benzene in CRC --
Q. Okay.
A. -- and net high is the high and the high.
Q. Okay. So those adjustments, as well as the adjustment for the Kroil are the only changes from Table 4 contained in your report; correct?
MR. DuPONT: He didn't adjust the Liquid Wrench numbers. He just adjusted what the total -- by reducing the Kroil numbers.

A. Right, the only, like, change is that Kroil value.
Q. All right. Doctor, I apologize if I asked you this already: Have any of your cases in which you worked as an expert witness or consultant been in North Carolina or South Carolina?
A. Let's see. There was one, and it never really actually went to trial, because they abandoned it, I think, but it was a South Carolina case where the issue was trying to get someone Workers' Compensation.
Q. Okay.
A. And I was involved in some of the early background work and report-writing on that. But I -- I think that wound up being settled before it ever even got to the point of a report.
Q. You didn't give a deposition or testimony in a hearing?
A. No, it never went very far.
MR. JEFFRIES: All right. Doctor, I think I will pass the baton so that we can wrap this up. I appreciate your time. Thank you.
THE WITNESS: Thank you.
EXAMINATION
BY MR. BENDER:

Q. Okay. Doctor Herrick, good afternoon. My name is Brian Bender. I'm with the law firm of Harris Beach, and we represent Safety-Kleen in the case. I apologize I couldn't be there in person. I will do my best to get this done quickly over the phone.

If you can't hear me or you don't understand something, please let me know, and we'll try to clear it up for you; okay?

A. Okay.

Q. All right. I want to go back to this number of 58 parts per million that you assumed was in whatever was in the Safety-Kleen parts washers when you did the ART modeling.

Do you remember talking about that earlier?

A. I do.

Q. I know that you said -- I think it was in response to Mr. Schultz's question -- that the 58 is intended to represent the amount of benzene in whatever was in those parts washers, taking into account evaporation or loss as a result of use of the parts washers; is that correct?

Did I characterize that right?

A. That was the way I tried to approach it,

yeah.

Q. How did you get there, is my question.

I mean, did you start with what you thought was the amount of benzene in -- in the pure, fresh batch of whatever was in those parts washers, and then do some math to get to the 58 -- 58 parts per million? Or did you do something else?

A. Well, no. What I tried to do was, I -- I used the 58 because that was the value that was in Fedoruk and also in the work that LeBlanc had done, and so I wanted to be able to make some comparisons across those two studies, as well as the -- you know, the calculation I was doing for the work that Mr. Rhyne did.

But I also felt that it gave me, you know, a margin -- you know, a good margin of -- of safety, recognizing that the parts washer didn't contain fresh mineral spirits, except maybe once every two weeks or so, because, you know, there was information from SK about the rate or the frequency of changing out the solvents.

So on any given day, the range, you know, would have been somewhere between the original content of benzene at the start of that change-out

period and -- and the benzene content as time passed.

So I felt that, you know, 58, in addition to being consistent with those other guys' worked, was actually a -- a pretty good value that was, you know, if anything, probably lower than the actual content that was present in the real world.

Q. So the 58 parts per million, is that in any way based on evidence that's been produced in this case? Or is it all based upon things that are extraneous to this case: other studies, other information you've seen, things like that?

MR. DuPONT: Form. Compound. Vague.

A. Well, yeah, in terms of, you know, what was really available about the mineral spirits that were used in these power plants, you know, I didn't really have any direct analysis or -- or specific information, you know, that would let me try to hone in on that. And so, as I say, I was trying to be conservative and -- and recognize that the -- the parts washers didn't contain fresh mineral spirits, and I felt like this 58 was a reasonable value that reflected what was actually in use.

Q. And you thought that was appropriate to use because of what you see in the Fedoruk study,

what you saw in the LeBlanc study.

Anything else?

MR. DuPONT: Form. Compound.

A. No, those -- those were the main considerations. As I say, the -- the data really wasn't very abundant to let me make a hard assumption about the actual starting point concentration.

You know, I mean, my -- my review of the literature suggested that, you know, in the fresh mineral spirits, you know, you had estimates anywhere, you know, from numbers around 100, other people who maintain that the levels were over a thousand in mineral spirits, and so I thought, Well, there isn't really a consensus value, so I'm going to -- you know, if anything, I'll use, you know, what may be a low-end estimate for my calculations, and so that's how I got to 58.

Q. Yeah. And as I see in your report at pages 24 and 25, there are references to some of these sorts of numbers. And particularly on page 24, that last paragraph, you make references to levels below 100 parts per million, and then I see references up to 10,000 parts per million. So we're going from less than 100 to 10,000. And you

ended up with 58.
And I'm curious. There's also a reference here on page 24 to some Safety-Kleen data that showed -- you have it as 32.7 parts per million. Was there some reason why you didn't use the 32.7, since it was a Safety-Kleen-related data, as opposed to taking it from Fedoruk and LeBlanc?
MR. DuPONT: Compound.
A. Well, you know, what I tried to do was kind of consider the universe of information that was out there, and, you know, that one data point from Safety-Kleen, you know, reflected the level that you mentioned. And I considered that, you know, in the context of all the other inputs, you know, to the decision, you know, that, as you say, reported information that ranged, you know, from somewhere around 100 to some values, you know, reported up to 10,000.
And so I thought, you know, picking a number in that order of magnitude -- like 58 -- was a -- was a safe value that, if anything, you know, might be off on the low end.
Q. Do you know whether or not Safety-Kleen produced any information in this case that would reflect levels of benzene -- either in fresh or

recycled solvent -- that it was distributing during the relevant time frame here?
A. I don't remember actually seeing -- you know, there -- there was information -- those safety data sheets and all from Safety-Kleen -- and I don't remember seeing something that necessarily would have been specific, you know, say, to the area of the country and this time period where Rhyne was working.
So, I mean, I guess that's, kind of, a long way of saying, I don't, you know, recall seeing that information.
Q. Did it matter to you in using the 58-parts-per-million figure that, for instance, Fedoruk intentionally spiked solvent to that level, as opposed to using -- I'm sorry -- using solvent that just had 58 parts per million in it?
MR. DuPONT: Compound.
A. No, I -- I -- you know, I mean, remember, we -- we talked about this a little bit earlier; that, you know, given the time and place where Fedoruk was doing the study, you know, what I'm imagining is that he was using mineral spirits that he was able to access locally there in California, and so he needed to -- to do that spiking to get it

up to 58.
Q. Do you know what the benzene content was in the unspiked solvent that he obtained for his study?
A. Well, the -- the low-end value that he reported was 9 parts per million. And so I don't know this with great certainty, but I -- I surmise that would have been the starting point material that he got for his project.
Q. Was there a reason why you didn't use 9 part per million, as opposed to the 58 that was intentionally spiked?
A. Well, I mean, again, just considering the time and the place, you know, given that this was a study in North Carolina and not California, you know, I -- and that it was, you know, work that was done you know, years before Fedoruk's experiment, I thought that, you know, the 9-part-per-million value was probably not a representative value for the mineral spirits that Rhyne was using.
Q. What is -- what is that based on with -- vis-a-vis the dates? Let's say, the date difference between Mr. Rhyne's work and Fedoruk's study, how does the date issue support the assumption that you just made; that the 9 would be

far lower a long time ago and -- I'm sorry -- the 9 would be -- I'm sorry -- far lower now than it would have been when Mr. Rhyne was working?
MR. DuPONT: Form.
Q. And I can rephrase that if I completely massacred your answer.
A. No, let me try to answer.
I mean, I think I -- you know, can respond.
Q. Yeah.
A. In looking at the published literature, you know, even people who, you know, come to different conclusions about the benzene content in mineral spirits, I think, you know, they would all agree that, over time, you know, the trend line has been to lower and lower benzene content; and -- and so, even if they come to a different you know, final number as to what they think is a representative value, I think there is some agreement that the concentrations have gone down with time.
Q. Can you point me to anything that would support the fact that 9 parts per million in fresh solvent as used by Fedoruk --
MR. DuPONT: Whoa. Whoa. Counsel, no.

No. No.
Q. -- is something that you --
MR. DuPONT: Why don't you pull up the Fedoruk study and see if the words "fresh solvent" and "9 parts per million" are listed together before you make that representation.
MR. BENDER: I'll rephrase it.
MR. DuPONT: I think if you looked at the study, it would say that it's recycled solvent.
MR. BENDER: I'll rephrase it.
Q. Can you point me to anything that shows that what appears in the Fedoruk study would automatically lead you to whatever number higher than 58 would have been the starting point for your assumptions in this case?
MR. DuPONT: Form.
A. I'm going to have to ask you to try that again.
I mean, I don't -- I didn't quite follow.
Q. Well, you're telling us that -- that you -- that you made an assumption in this case that fresh solvent in these parts washers would have contained benzene in excess of 58 parts per million by volume; right?
A. That's right.

Q. And what I'm asking you -- I mean, you're not giving us what that number is, but if there's something that you can point us to that would allow us to do some math to figure out what that number would be, whether it's extrapolating from the 58, or extrapolating from the 9 that we see in the recycled solvent in Fedoruk that wasn't spiked.
MR. DuPONT: Compound. Just not understanding, Counsel.
A. Yeah, I'm -- maybe I'm just -- getting too late in the day, but I'm afraid I'm going to have to ask for that again. I didn't quite -- I don't know quite how to respond.
Q. It is getting late. I'll try it again.
Other than just saying that you've seen things in the literature that say the benzene content in solvent has trended downwards in more recent years, is there anything else you can point us to that would enable -- would enable us to draw a curve and relate the assumption you made in this case at 58 parts per million to what Mr. Rhyne was actually using?
MR. DuPONT: Objection. Vague and ambiguous.
A. Well --

Q. Are you basing that statement, sir, on anything other than just a general review and understanding of the literature?
A. Oh, okay. Well, I can -- I can try to answer that.
I mean, my -- what I tried to do in -- in using that number was reflect what I think would be a good representation based on what's presented in the literature about the benzene content of mineral spirits during the -- the time period when Rhyne was using it, recognizing that, you know, I think, if anything, it is potentially on the low side. But that would -- that would be appropriate, you know, given that it isn't fresh mineral spirits in the parts washer.
Q. And the literature you're referring to is -- is what? I mean, you've talked about Williams today.
Is -- is that one of them?
MR. DuPONT: Come on, Counsel. It's listed in the report. Why have you got to do this at 4:40 in the afternoon in a deposition starting at 9:00 o'clock in the morning when you've already deposed him on the issue?
MR. BENDER: Andrew, you're killing more

time right now.
MR. DuPONT: No. Compared to what you're doing, not at all.
A. Well, what I -- let me try to answer. I mean, you know, the two, you know, really, you know, kind of, wide-ranging reviews that I -- that I -- that I relied on were this Kopstein review paper and -- and the Williams review paper.
And so, you know, they came up with different, you know, conclusions about the benzene content in fresh mineral spirits, and so I tried to recognize, you know, what that range would be. And for the sake of the calculation I did, I actually picked, you know, the 58, which is, you know, if anything, you know, I think below that range.
But as I said before, I think that's appropriate given that, you know, what was in Rhyne's parts washer wasn't necessarily fresh mineral spirits.
Q. On page 26 and 27 of your report you talk about how the results of your modeling stack up against Fedoruk's work.
Do you know where that is?
A. Right, I do see that.
Q. And you talk about the fact that Fedoruk

-- this is right at the bottom of that paragraph on page 26. He says -- I'm sorry. You say that Fedoruk came out to 440 parts per billion for the personal exposure.

Do you see that?

A. I do see that, yeah.

Q. And then there was another -- at breathing zone height it was at 550 part per billion.

Do you see that?

A. I do see that, yeah.

Q. And, then, your results were something different; right? Up top you gave an example of the one-hour period being a range of 1.2 to 4.4 parts per million?

A. That's --

Q. And then you talk about -- you talk about a temperature difference. And if I -- tell me if I'm reading this correctly. You think that -- and this is language from page 27 -- your results and the Fedoruk results were in very good agreement.

Is that a fair way to read what you're saying here?

A. Yeah, that's what I said; right.

Q. And -- and although they were somewhat different, you're accounting for a temperature

difference; right?

A. Right, I think that was a factor in -- in the difference, yes.

Q. Would you have expected to see -- I think you're saying -- that doubling for every 18 degrees Fahrenheit? And I think, based on your -- your temperature difference -- we were just under 18. So to get this math to line up, we would expect something less than doubling, based on the difference in temperature between your work and -- and Fedoruk's work?

A. Yeah, I -- I wasn't -- if I could just clarify. I mean, you know, when -- when I'm using the term "good agreement," you know, I'm anchoring that, you know, back to other studies that have been done comparing measurements and models and -- and between models; and, you know, in -- in the world of those comparisons, a factor of 2 difference is actually really considered good agreement.

Q. So is that a reference just to your results being compared to Fedoruk, or your results being compared to other things as well?

MR. DuPONT: Objection. Form.

A. Well, this would be a comparison that, you

know, would apply across, you know, any number of -- of comparisons of, say, between measurements and -- and between measurements and models, but I was specifically referring to it as a good agreement between my results and Fedoruk's.

Q. And you would still describe it as very good, even though your results are higher than double when, according to the rule that's cited here, we would expect to see them -- your results somewhere less than double?

MR. DuPONT: Objection. Form. Compound.

A. Yeah, I mean, and not to -- to try to beat up on other experts, but in -- in the review, the critique that Spencer wrote of my report, you know, he reported some of his own comparisons between measurements and models where the difference was a factor of 4; and he characterized that as being excellent agreement.

So it -- anyway, I'll just leave it at that.

Q. With respect to your results as compared to Fedoruk's results, did you do anything to verify or -- or assess the validity of Fedoruk's results? Or did you take them at face value?

A. I didn't do, for example, any, you know,

recalculation or any, you know, separate experiments to try to -- to do any validation of his results, no.

Q. Okay. Did you do anything to determine whether or not the results that are listed in his paper are consistent with one another?

(Court Reporter comment.)

MR. DuPONT: Form.

A. Help me understand the question.

Are you referring to, say, the comparison that he did between the different levels of benzene concentration in -- in the mineral spirits and the results?

Is that what you are wondering about?

Q. What I'm -- what I'm asking -- to really just get to the point is, we know there -- there were two substudies in the Fedoruk paper; right? There was a review of results in the unspiked sample of solvent, and, then, there was a set of results for the spiked sample of solvent. And there were results in both of those studies for breathing zone, perimeter -- all the different sampling media that they used.

Do you recall seeing that in the Fedoruk paper?

A. Yeah. Right. He had personal samples, and he had area samples. I do remember seeing that, yeah.
Q. Did you do anything to assess whether or not the results that were shown across all those media in the -- the first study, the -- the unspiked study -- were consistent or in line with the results that are seen in -- in the second study, the spiked study?
MR. DuPONT: Objection. Form.
A. Only in -- in, sort of, a qualitative sense in that, you know, the air levels that he reported in the work that was done at the lower benzene concentration, those air levels were lower than the air levels that were found using the higher benzene concentration.
So, you know, in, sort of, a qualitative sense, I would say that I felt that there was consistency within his data, yeah.
Q. Okay. And -- and, then, did you do anything to assess whether or not the parts washer that was used in the Fedoruk study was the same or similar to or different from the parts washers described by Mr. Rhyne?
A. I didn't really have the -- you know,

exactly the same level of detail from Rhyne's testimony as was reported in Fedoruk. You know, Fedoruk had dimensions and everything else.
But just on, you know, a descriptive basis, the configuration sounded to be similar.
Q. Okay. All right. Really quick going to the appendix in -- in your report.
A. Okay.
Q. A little earlier you spent some time looking at the ones that have to do with fresh mineral spirits parts washing involving a 5-gallon bucket.
Would I be correct in saying that none of those reports have anything to do with Safety-Kleen?
A. Well, the -- you know, discussion that we had around his recollection -- around Rhyne's recollection was, he reported that he went to the painters and -- and got a bucket of Varsol. And so that was the identifying information that I had for that particular process.
Q. That's fine.
And -- and so that's all you were thinking about or all you were analyzing when you did the ART modeling for fresh mineral spirits parts

washing, right, was the testimony you just referenced?
A. And are you -- I guess I'm trying to understand --
MR. DuPONT: I think he's trying to ask you: The fresh mineral spirits parts washing in a bucket was not from the Safety-Kleen parts washing machine.
A. Oh, is that -- is that the question?
Q. That's the question.
A. Okay. Well, given that he reported that he got the -- the Varsol from the painters, you know, I -- I'm going to say I think it's probably reasonable that that wasn't coming from the Safety-Kleen product stream.
Q. Okay. So -- and I think, just to be perfectly clear, the only modeling you did with respect to Safety-Kleen and parts washers related to Safety-Kleen was ART modeling; right?
A. That is correct, yeah.
Q. Okay. And all of the ART modeling that relates to Safety-Kleen is contained in the balance of these ART reports, the ones that say "benzene from parts washing," 18 June, '19?
A. That's right. That's correct, yeah.

Q. Why do these reports say "Exposures as calculated in LeBlanc 2018"?
A. Oh, I -- that's just a note that I put in there to myself, because what I did was, you know, take -- took a look, 'cause what she had done is carried over the information that was presented by Fedoruk about the conditions in the room, and the -- the size of the -- of the tank and whether it was fully enclosed. You know, those inputs that we talked about earlier on the modeling, you know, the inputs to the ART system.
So that's -- that was the note that I just added there just to remind myself where that came from.
Q. And -- and you referenced "her."
You're talking about who?
A. Oh, I'm sorry, I'm talking about that paper by LeBlanc.
Q. I think you said somebody carried this over.
A. Oh, I -- well, in -- in the LeBlanc paper, taking a look at the model inputs that were used for ART, they were the same conditions that were reported from the workplace that Fedoruk -- that -- where he did the sampling.

Q. Okay. And so you applied those same parameters to your modeling of Mr. Rhyne's exposure?
MR. DuPONT: Form.
A. Well, I -- I adjusted, you know, where there were differences, but I think, for the most part, those were the same, yeah.
Q. All right. So to speed this up, as far as I can tell -- correct me if I'm wrong -- all of the ART modeling you did that bears on safety cleaning included both near field and far field; correct?
MR. DuPONT: Form.
A. That's correct, yeah.
MR. DuPONT: I'm sorry.
Q. Would the same thing be true here that you -- you had said earlier that you -- you wouldn't need to do far field with respect to the parts washing modeling?
(Court Reporter comment.)
A. I think in a case like this, you know, given where he was, you know, doing this, you know, I -- I wouldn't rule out that there couldn't have been secondary exposure sources, and that's what I was trying to address, you know, by including that far-field contribution.

But, you know, the -- these could be recalculated using just the near-field approach.
Q. Secondary exposure sources being other parts washers containing something associated with Safety-Kleen or -- or other sources of exposure?
MR. DuPONT: Form.
A. Yeah, I was thinking more of other sources of benzene exposure in general.
Q. And so if you included that as far-field exposure in these models of Mr. Rhyne's exposure to parts washers enclosing something with Safety-Kleen in it, you're actually including nonSafety-Kleen exposures; right?
MR. DuPONT: Form.
A. Yeah, what I was trying to model was the -- his exposure during, you know, the parts-washing process. And so if there is contribution from -- from other sources, it wouldn't have to be from -- you know, attributable to Safety-Kleen.
Q. But if you were trying to attribute a specific amount of exposure to Safety-Kleen, we couldn't use these reports on their face, could we? We'd have to back out all that secondary stuff that has nothing to do with Safety-Kleen; right?

MR. DuPONT: Object to form.
A. Yeah, and I -- I guess it's just a difference -- I wasn't really trying to do the calculation in such a way that attributed something uniquely to that product. I was looking at his exposure, you know, overall in the environment where he was doing the parts washing.
Q. So how -- how can you then use these reports that are in your appendix that say, "benzene from parts washing" to attribute a specific amount of Mr. Rhyne's alleged exposure to a Safety-Kleen product with any specificity?
A. I see your point. Okay.
Well, in this -- in this case, you know, if there was a big contribution, you know, from another source, it -- it would be -- or whatever the contribution is -- if there is a contribution from another source -- it would be nested under the mineral-spirits-part-washing category.
Q. Nested meaning -- meaning what?
Then, how would we interpret your report if we just wanted to find out what exposure can actually be attributed to Safety-Kleen to a reasonable degree of scientific certainty?
A. Oh, well, the -- you know, and which I

could -- I could certainly do this. I could go back and -- and recalculate and -- and, you know, just estimate -- just model only the contribution from the part-washing source, the near field where he was working, and not include the far-field contribution.
Q. But -- but can we do that?
Can we identify, to a reasonable degree of scientific certainty, Mr. Rhyne's exposure to Safety-Kleen only using your report as it exists right now?
A. I think it's -- it's a -- it's a good estimate, a good modeled estimate, but it could be refined if -- if the calculation were done in a different approach, yeah.
Q. But a good estimate is different from something that is reasonable to a degree of scientific certainty; right?
I mean, would you stand behind this and say this report is exactly what Mr. Rhyne's exposure was to Safety-Kleen?
MR. DuPONT: Well, you just asked two different questions. You asked reasonable degree of scientific certainty, and the exact exposure.
MR. BENDER: You're right. I'll rephrase

that.
Q. Could you under oath tell a Court or a jury right now that what is in this report represents, to a reasonable degree of scientific certainty, what Mr. Rhyne's exposure was to any given Safety-Kleen product only?
A. I would have to say, you know, that the approach that I took to the modeling didn't uniquely target the contribution from the Safety-Kleen product. It was the exposure overall as a result of the parts-washing process, which -- where there could have been other sources of exposure.
MR. BENDER: All right. Thank you, sir. That's all I have.
MR. DuPONT: Very quickly -- no, this is going to be it, 'cause we're leaving.
THE PHONE: Andrew, is that you? I can't tell. I'm sorry to talk over you. I don't want to let you go if I haven't gone yet.
MR. DuPONT: Who is this?
MR. DIXON: This is Josh Dixon for Satogran.
MR. DuPONT: How much time do you have?
MR. DIXON: Five, ten.

MR. DuPONT: Let's take a break.
(Recess was taken.)
MR. DuPONT: We're on the record. It's 5 o'clock. I'm opening up questioning to people on the phone.
EXAMINATION
BY MR. DIXON:
Q. I have some questions for you regarding the statements in the report regarding the outdoor work with the father.
A. Okay.
Q. You state on page 31 of your report that you conservatively estimated that Mr. Rhyne you put that one-third of the time he worked on the family cars.
Do you see that?
A. Yeah. I'm looking right now, yeah.
Q. How did you come up with that one-third time number?
A. I'm trying to remember. He was asked about, you know, the overall work process and how many times -- you know, he worked on the car with his father once a month about six or seven hours each time -- I'm just looking at the notes here -- how he used the Kutzit it.

And I estimated that -- and I think this was as a result of -- of the responses that he gave to the questions, that he didn't use Kutzit every time. He didn't always remove the gaskets.
And so that -- I think he -- he may have used that figure of one-third. I don't remember the exact language in the deposition, but that was what I used to recognize that he didn't always use Kutzit.
Q. If he did not say that he used Kutzit one-third of the time, would you admit that this is speculation?
MR. DuPONT: Objection. Form.
A. Well, I haven't looked at his, you know, deposition, but, you know, this would be my estimate, you know, which I would -- you know, which I used for the calculation.
I don't remember if he was specifically asked about this or not.
Q. So if he wasn't specifically asked about it, how did you come up with the one-third estimation?
A. Well, that -- that was my value that I estimated as -- as a reasonable frequency for the kinds of work that he described doing on these

cars.
Q. But how did you arrive at that information?
MR. DuPONT: Just asked and answered.
Q. You can answer, Doctor.
A. Yeah, I mean he --
MR. DuPONT: He did answer it.
A. He -- he -- well, if you take a look at the kind of work that he was doing where he wound up removing gaskets, he was, you know, taking off the valve covers, he was taking off the oil pan gaskets. So he clearly didn't do that every time that he worked on the car, but I thought it was a reasonable estimate to say, Well, those were kinds of tasks that he would have done about a third of the time.
Q. Okay. On that same page you described your methodology for the ART model; correct?
A. That's correct.
Q. And that's at the very bottom of page 31.
And as you describe it in the last two paragraphs of page 31, you assume that took Mr. Rhyne 30 minutes to apply the Kutzit and then another 60 to scrape it off the automotive head gasket, the oil pan gasket he was working on; is

that right?
A. Yeah, I believe that was, you know, information that he provided in his deposition.
Q. Okay. And, then, in the appendix -- we've looked at this already -- but the hard backup or detail, it states that he was in the near field for this entire 90 minutes; correct?
A. I'm just --
Q. I'm looking now on here -- go ahead.
A. Yeah, I'm just taking a look right now.
(Witness reviews document.)
Yeah, that -- that's the duration I used was that 90-minute period.
Q. Okay. So the near-field exposure in the ART model is based on exposure data for people continuously staying in the same place -- or at least staying in the near field while using the product; correct?
A. Yeah, the idea would be that he was, say, somewhere around in about a 3-foot radius of the part that he was working on.
Q. Okay. And on page 3 of that appendix, the data source is referred to as the "Spreading of glue"; right?
A. Well, see, that's in the Bayesian model

adjustment. So that was the scenario that they derived the information for that they -- that they used for the adjustment, yeah.
Q. Okay. But applying Kutzit to an automotive gasket is not similar to spreading glue; is it?
MR. DuPONT: Objection. Form.
A. Well, it -- you know, I think -- no, I mean, it's not identical. I would just point out, you know, this is one of those cases where, by doing the Bayesian adjustment, it actually lowered the exposure from the mechanistic model; and so it -- this is a case where -- where, again, I chose the lower value.
Q. Okay. Have you ever read the product description of how Kutzit is supposed to be used?
A. I remember seeing the information on the labels in some of cans. I don't know if I've actually -- I don't recall the actual product use instructions.
Q. I'll represent to you the -- the instructions or the directions are to let the product soak in for 15 to 30 minutes between the initial application and the scraping stops.
If that's the case, isn't it true that

this number -- the number that came up in the ART model -- would overestimate the exposure?
MR. DuPONT: Objection. Form.
A. Are you referring to the length of time that he let the Kutzit sit there in 15 minutes versus 30? Is that --
MR. DuPONT: No, he's saying what the label says, not what Mr. Rhyne actually did.
Q. No.
What I'm saying is that, if the product were applied, there would be no reason for the individual to stand there over the product, and watch it work. He could walk away --
MR. DuPONT: Objection.
Q. -- while the product worked.
If that happened this would -- your estimates would overestimate the exposure; correct?
MR. DuPONT: Objection. Form.
A. Well, if he -- if he didn't stay, you know, right at the -- you know, in the location where he was doing the work, and, you know, he went in the house to watch TV or something, yeah, he wouldn't -- he wouldn't be, you know, close to the source of exposure, so his exposure would be lower.
MR. DuPONT: Of which there's no evidence.

Q. So the ART model assumes a person is standing within 3 feet of the application for the full 90 minutes; is that correct?
A. Yeah, that's -- that's the way the model operates. It's estimating the exposure in -- in that near-field range.
Q. Okay. Do you know the surface area for a V8 automotive head gasket?
A. Well, I remember seeing them in the distant past when I worked on cars, but I -- I don't know that I could really give you a good, you know, point estimate of that.
Q. Would approximately 100 square centimeters seem reasonable to you?
MR. DuPONT: Objection. Form.
A. Let's see. That's about 10 centimeters by 10 centimeters? I -- that might be -- that might be a little on the small side. I really, you know, wouldn't --
MR. DuPONT: Don't guess.
A. -- feel comfortable trying to guess at that.
Q. Okay. The -- as I understand it here -- and I'm looking now on page 2 of the Kutzit appendix -- the ART model simulation uses a

scenario based on application of surface area of .1 to .3 square meters; is that right?
A. That's right, yeah.
(Attorneys Fishkin and Schultz left the room and joined via telephone.)
Q. That's between a thousand and 3,000 square centimeters; right?
A. I think that's -- that's right, yeah.
Q. So if these assumptions in the ART model assume that the product was applied to a minimum square surface area of a thousand square centimeters and the real situation is closer to 110 square centimeters, isn't it likely that the model overestimated exposure?
MR. DuPONT: Lacks foundation.
There's no evidence that it was the size you're saying it was.
Q. I'd like you to assume, Doctor, that the square centimeterage of an automotive head gasket is 110 square centimeters, isn't it true that this model would overestimate exposure?
A. Well, you know, and I -- I don't really know the size of area for -- for an automobile head gasket, but in answer to your question, if the area that was actually -- you know, where the Kutzit was

applied is -- is smaller, then -- then there would be less exposure.
Q. Okay. And -- and here in the hypothetical I've just posed, it would be significantly smaller; right? I've posed the hypothetical of 110 square centimeters. The ART data had the smallest size being 1,000 square meters; right?
MR. DuPONT: Objection. Form.
A. That's -- that's what the situation -- you know, that's what the model calls out, yeah.
Q. And so the overstatement in my hypothetical is close to a factor of 10-fold; right?
MR. DuPONT: Objection. Form. Lacks foundation.
A. Yeah, and I -- you know, I don't really know what the effect of that would be on the ultimate exposure that's calculated. I'd have to, you know, try that in the model, put a different area in there, and see how big the effect is.
Q. For the -- I'm looking now at the same page where it says, "Spreading of liquid at surfaces or work spaces."
Do you see where I am on the second page of the appendix?

A. Yes, I do.
Q. Is there a -- a category for work pieces that are smaller than that that you could have entered?
A. You know, I'd have to take a look at it. Just sitting here right now, I actually don't remember if it is or not.
Q. Okay. Are you aware of an approximately how long it takes for a person to scrape a softened head gasket following the application and soaking-in time for Kutzit?
MR. DuPONT: Objection. Form.
A. Well, as I recall, I mean, I think he was asked about that. I thought he -- I thought he said it took about an hour.
Q. If the total scraping time actually took approximately 5 minutes, you would agree that that would reduce the exposure significantly; correct?
MR. DuPONT: Objection. Form.
A. Well, I'm looking in -- in the report -- you know, again, I don't have his deposition right in front of me. But, you know, what I said in the report was scraping the gaskets took over an hour. And -- and that, you know -- you know, that must have come from his deposition. You know, that --

that would be the source of that information.
Q. Right. I'm just asking you to assume that instead of an hour it took five minutes.
And, then, the question is you would agree that that would reduce the exposure to benzene; correct?
MR. DuPONT: Objection. Form. Incomplete hypothetical.
A. Yeah, well, the -- the duration of time that he spent, you know, in the -- contact with the material would -- would have an impact on the level of his exposure.
Q. Right. And it would decrease it based on the decrease in time; correct?
MR. DuPONT: Incomplete hypothetical. Form.
A. Yeah, the -- the time would be lower and -- and so would the exposure level.
Q. Okay. Thank you.
I want to talk now about the work at Setzer Buick.
A. Okay.
Q. Give me a second.
Based on your prior testimony, my understanding of your methodology here is that you

used an ART model for the exposure of working on cars for home use, but for Setzer's and Duke, the estimation was based on the Young 1978 study; is that correct?
A. That is correct, yeah.
Q. Was the Young study data generated by evaluating indoor or outdoor use, if you know?
A. It -- it was indoor. It was in a -- I think a two-car garage, a two-door garage.
Q. And do we -- do you have any information as to whether Mr. Rhyne's work at Setzer was indoors or outdoors?
A. I'm trying to remember what he said about the -- the workplace at Setzer. You know, it's a mechanic shop. So, you know, I thought it was reasonable to assume that it was that work done indoors.
Q. If it was -- some of the work was done outdoors, would that change your values that you arrived at --
MR. DuPONT: Objection.
Q. -- for the exposure at Setzer?
MR. DuPONT: Form. Incomplete hypothetical.
Are you suggesting that Mr. Rhyne

testified that he used Kutzit outdoors at Setzer?
MR. DIXON: I'm simply asking a hypothetical question of the expert.
A. You know, I haven't done the comparison of between -- I guess we could -- you know, what his levels were when he did the work outdoors, versus what the model predicted. But if there were better ventilation outdoors, you know, it wouldn't be unreasonable to say that the exposures could have been lower.
Q. Okay. Thank you, Doctor.
There was -- according to your expert report the formula for Kutzit changed; correct?
A. That's my understanding, yes.
Q. Okay. And it looks like the formula change -- or at least there's evidence of a formula change that occurred right around the time of the calendar year turning from 1973 to 1974; right?
MR. DuPONT: Objection. Form. Misstates the evidence.
A. I have to -- to look at this. My -- you know, the way I approached it was I, you know, assumed that the Kutzit that he used through 1974 was the older Kutzit that contained benzene, and the Kutzit that he used starting in 1975 was the --

the product that had replaced it with toluene.
Q. And why did you make that assumption, Doctor?
A. Well, there's some data -- and, then, I'll try to see if I can find the right pages in the report here where I talked about what I had in the record about the composition of Kutzit.
Let me just try to find that here. (Witness reviews document.) You know, I think I -- I think I must have it in the --
Q. If it helps you, Doctor, I'm looking at on page 17 of your report.
A. Yeah, it does. Thank you. I was just trying to sort out the pages here.
Yeah, there was information, you know, that I -- that was provided to me about the timing of the replacement and -- and the changes in the formulation. And so on that basis, I, you know, felt that this cut date using -- using a cutoff of 1974 as -- as being the end date for that benzene-containing material in use, and that the new formulation would have been what he used starting in 1975, I thought that was -- that was a reasonable point to -- to draw that distinction.
Q. Drawing your attention to -- to page 17,

the -- towards the bottom -- or the end, rather, of the second full paragraph, do you see the sentence that begins -- the one after footnote 203 in the main text, and "Savogran inventory records indicate that the blend of benzene and acetone was used until February 28th, 1974"?
A. I do see that, yeah.
Q. Does that mean that the benzene was no longer used after that date?
A. Well, my -- my interpretation of that record would be that, with the manufacturing process that was in place after that date, the new formula was being formulated, the new -- the new toluene-containing formula was being prepared. And so my rationale, though, for thinking that the end of '74 is a good cut-point time is that there would have been product that was in -- in the marketplace -- you know, was in the product stream, and that that, you know, we could say was -- was being used until it was depleted at the end of '74.
Q. You don't know how long product sat on the shelf in 1974; correct?
A. I don't really have any information in the record about that. That's -- you know, I tried to make a -- a conservative assumption that by the end

of '74, it had all been moved out.
Q. Okay. And you don't know whether or not this particular entity, Setzer, acquired product directly from Savogran; right?
A. This would be Setzer's?
No, I really -- I don't remember seeing anything in there about what -- what the source of the Kutzit was.
Q. Okay. So if Setzer purchased product directly from Savogran such that they didn't buy off the shelf, isn't it plausible that the product could have sold to Setzer as early as March 1st, 1974?
MR. DuPONT: Objection. Form.
Q. The new mixture I mean.
MR. DuPONT: Objection. Form. Incomplete hypothetical.
You're also contradicting what your client says.
A. You know, I -- I really, you know, I mean, it's kind of a speculation on my part, I guess, to know, you know, what the inventory practice is and -- and how they would have approached it.
Q. For purposes of generating exposure opinions after that change, you state -- or you

assume that the Kutzit used by the plaintiff in 1975 at Setzer contained 20 to 2 -- sorry -- 25 to 50 percent volume by weight; correct?
A. That's right, yeah.
Q. And where did you get that -- on what do you base that assumption?
A. I'd have to go back -- you know, I'd -- just sitting here right now, I'm -- I'm not sure I can recall exactly where that came from. They, you know, clearly got rid of the -- the benzene content. And I -- I do recall information I saw in the record that toluene was the replacement, but I -- I can't point you to a -- an exact document right here.
MR. DIXON: That's all the questions I have. Thank you.
MR. CAIRONE: One minute, just because -- on Exhibit 12, okay?
FURTHER EXAMINATION
BY MR. CAIRONE:
Q. Doctor, can you look at Exhibit 12?
A. Yeah.
Q. This is the exhibit where you changed at least part of your exposure assessment; correct?
A. This is where I revised the Kroil.

Q. Yeah. I just want to make it clear for the record that that also changes your conclusion on page 44 of your report.
So if you could look at page 44, the current report says, "The total mean cumulative benzene exposure Mr. Rhyne experienced ranged from 8.86 to 34.44 ppm-years, with a midpoint estimate of 19.77 ppm-years"; correct?
A. That's what it says now, yeah.
Q. And that's not right anymore, is it?
A. No, and that's why -- you know, I don't know exactly what the right maneuver would be, if I should do an errata sheet or another revision.
Q. Well, I'd just like to ask you the question.
A. Oh sure.
Q. So based on Exhibit 12, that opinion now would be the total mean cumulative benzene exposures Mr. Rhyne experienced ranged from 8.79 to 27.48 ppm-years, with a midpoint estimate of 18.135 ppm-years, which is what I calculated -- you're -- you're free to check that midpoint, but everything I said is correct, subject to your verifying that midpoint.
Do you agree with me?

A. Yeah, I think.
My calculation of the midpoint -- well, I'd have to -- I'd have to calculate it, but I take that, you know, since you did the calculation.
Q. But you do agree with me now that the range is from 8.79 to 27.48 ppm-years; correct?
A. That's -- that's what I calculated to, yeah.
MR. CAIRONE: Okay. Thank you, Doctor.
EXAMINATION
BY MR. DuPONT:
Q. Doctor Herrick, I just need to be clear about a couple of things.
When you talk about flammability assumptions, you're talking about the vapor in the air not the liquid itself; right?
A. That's right, I did.
Q. All right. So -- I don't know, US Steel was attempting to suggest that a flash point of 25 degrees Fahrenheit meant that if Liquid Wrench was used on something that was hotter than 25 degrees Fahrenheit, that would create a fire hazard, but obviously things that are 25 degrees Fahrenheit are below freezing; right?
A. 25? Yeah.

Q. Okay.
A. Yeah.
Q. So that would suggest that anything that Liquid Wrench was used on that wasn't frozen would create a fire hazard, which makes no sense; right?
MR. CAIRONE: Object to the form. Leading.
A. Well, that was why I was trying to -- in answer -- you know, to answer his question or respond, I was trying to redirect it more around the flammable limits, 'cause that's -- that's really the meaningful concept when it comes to the fire risk.
Q. Right. It's -- it's what's -- it's the vapor concentration in the air that matters; right?
A. It's --
MR. CAIRONE: Objection. Leading.
A. -- yeah, 'cause it's the vapor that burns; correct.
Q. For example, if there was another document concerning the Liquid Wrench product that showed that there was an autogenous ignition temperature of 309 degrees -- 390 degrees Celsius, which is actually over 700 degrees Fahrenheit that discussed the temperature at which combustion in the air

would occur from the vapors of the product, that's more along the lines with your opinion about the lower flammability limit of benzene in a product.
MR. CAIRONE: Leading.
A. That's -- that's a more related concept than the flash point we were talking about, yeah.
Q. Okay. And if the other hydrocarbons in the Liquid Wrench -- like ethyl benzene and hexane and xylene and cyclohexane -- had similar lower flammability limits to them as benzene, then those other aromatic hydrocarbon would not greatly reduce the lower flammable limit for benzene; correct?
MR. CAIRONE: Form. Form and leading.
Q. Based on -- for Liquid Wrench, based on benzene.
MR. CAIRONE: Same objection.
A. No, I think, you know, it's -- those are all pretty chemically and physically similar materials. And so they're -- they're all in that same range of flammability.
Q. All right. So basing the feasibility of Mr. Rhyne using Liquid Wrench in the way he and his coworker, Mr. Couch, testified about using Liquid Wrench in the pipe prefab shop, basing that off of the flash point wouldn't be the correct way to

look; is that fair?
MR. CAIRONE: Leading.
A. Yeah, I mean, just in -- in that specific case, but also in general terms of thinking about the risk of fire or explosion, it's really the upper and lower flammable limits that are -- that are the relevant metrics. It's not the -- the flash point.
Q. All right. The Fedoruk study -- so this is clear -- when they took the sample of mineral spirits, it was -- actually, strike that.
In the Fedoruk study when they found 9 parts per million benzene, that was on recycled parts-washing solvent; right?
A. That's my recollection of their discussion, yeah.
Q. And that was sourced in California; right?
A. It was, yeah.
Q. Okay. And you've seen many data points from the ATSDR, published peer-reviewed literature that shows that there are much higher quantities of benzene in mineral spirits, which was the basis of the Safety-Kleen parts washing solvent; fair?
A. That's a fair --
MR. BENDER: Objection to form.

Q. And you've seen data from the Southwest Research Institute study that there was benzene emitted from Varsol at levels that exceeded a part per million?
A. I have seen it --
MR. SCHULTZ: Object to the form.
Q. And you referred to -- earlier in your testimony -- a NIOSH HETA study by Kaiser and McManus that was using a mineral spirits-type product that caused exposures to benzene over a part per million?
MR. SCHULTZ: Object to the form.
A. Yeah. I have seen that report, yes.
Q. All right. So when you look at 58 parts per million in parts washing solvent that is, as you said, at the low end of the representative benzene content of the mineral spirits?
MR. SCHULTZ: Object to the form.
A. I'm sorry. Could you repeat that?
I didn't follow the question completely.
Q. So 58 parts per million benzene in mineral spirits is at the low end of what one would assume the mineral spirits benzene content would be.
A. Well, that's what I tried --
MR. SCHULTZ: Same objection.

A. That's what I tried to reflect by using the range that I did, yeah.
Q. All right. The McGuire-approved chemicals list that listed Tap Magic or Rapid Tap, that didn't say that Tap Magic and Rapid Tap were available for use in the pipe fab shop during the period 1976 to 1979; correct?
MR. CAIRONE: Leading.
A. There's -- there's no information in that inventory about where the products were used in the -- in the -- in the plant.
Q. Or that they were used in the plant in 1976 to 1979; correct?
MR. CAIRONE: Leading.
A. No it's, it's a point-in-time inventory document, it looks like.
Q. Okay. And I want to be clear.
And your report accounts for this, but after Mr. Rhyne transferred to the Catawba plant, he continued to go back to McGuire and perform maintenance work there; is that fair?
A. That is fair. He did go out on those outages.
Q. Okay. With respect to the testing that was conducted on archive samples of Kroil product,

are there concerns that one should have about testing archived samples of product?
MR. JEFFRIES: Objection.
A. Yeah, and I haven't really seen, you know, details about the methodology. I've seen the certificates of analysis, but it would really be important to know how they assured sample integrity over the time, especially since some of those samples, if they were taken from the '80s, you know, the material was over 30 years old.
And so it would really be important to know how they -- how they verified that that was still the -- you know, that that was still a valid sample.
Q. All right. And what would you want to do to verify that it was still a valid sample?
A. Well, going back in time, it would be kind of hard, unless they had some analysis from the time when the sample was actually archived and they could compare the results of that analysis with the analysis that's being done today.
I mean, I've done this kind of stuff in some of my research, and what we do, if you're going to archive a sample, is, you take the chemical and the ingredient that you're interested

in analyzing, and add a known quantity of that material to the sample, then put it into the archive, and when it's removed 10 years later -- or whatever time later to do the analysis -- you check to see how much of that known amount is still there.
Q. When gas chromatograph testing is done on a product, what volume of liquid is actually tested?
A. It's microliters. It's a very tiny amount.
Q. And should one also test the headspace, meaning the area between the top of the liquid and the top of a container within a product to see what amount of benzene evaporated into that area?
MR. JEFFRIES: Object to the form of the question.
A. Well, I think especially if you were looking at a -- a mixture that included volatile fractions like benzene, you would want to know how much of it was present in the headspace, yeah.
Q. And you'd also want to know whether the archive sample was kept in a way that the benzene didn't evaporate off of it?
MR. JEFFRIES: Object to the form.

A. Yeah, that's, kind of, what I was getting at in terms of sort of trying to establish the integrity of the sample. You know, how was it stored? What kind of conditions was it stored under? What kind of containers was it stored in?
Q. Now, assuming that there are records from Safety-Kleen indicating that there was problems with their product stream being contaminated with things like gasoline and Liquid Wrench that would increase the benzene content of the parts washing solvent beyond just what was in mineral spirits, that's also something that can be considered in determining the benzene content of the parts washing solvent?
A. Yeah --
MR. BENDER: Objection to form.
A. -- you know, given the description of -- of how people, you know, use the parts washers, you know, that it was not unusual that old solvent was dumped in there or gasoline was dumped in there, things like that. So the benzene content isn't uniquely a property of the mineral spirits themselves.
Q. All right. And to be clear, when Mr. Rhyne's skin came into contact with products that

he described using, such as Liquid Wrench or Kutzit or mineral spirits, was there dermal absorption of benzene?

A. Oh, yeah. And I tried to say that in the report; that, you know, it's -- everyone agrees that skin, you know, can be a significant route of exposure. And he reported, you know, having dermal exposure.

In fact, at some points he -- I think he mentioned he had trouble playing basketball because his fingers were cracked as a result of his exposures at work.

So there's definitely dermal uptake, which is what I tried to say in the report.

Q. And have there been studies, for example, on mechanics that have found that 80 percent of their benzene exposure came from the dermal route?

MR. CAIRONE: Leading.

A. Well, there's a very substantial literature out there on dermal uptake of benzene, and so that -- and that's one of the findings that's included in that, yeah.

Q. So your calculations of Mr. Rhyne's benzene exposure is -- actually underestimated his benzene exposure because you didn't calculate

the -- the dermal uptake?

A. That's correct, yeah.

MR. DuPONT: Okay. Those are all the questions I have.

MR. BENDER: This is Mr. Bender. I have one quick one.

FURTHER EXAMINATION

BY MR. BENDER:

Q. Doctor Herrick, Mr. DuPont just asked you a hypothetical question about Safety-Kleen having the quote/unquote "problem with its solvent stream."

Did you review any documents that would support that hypothetical in preparing this report in this case?

A. I'm trying to think. I -- I don't remember a specific document that I -- that I saw for this case, no.

MR. BENDER: Okay. Thank you. That's all I have.

MR. DuPONT: Actually, I think the term Safety-Kleen uses is that we are losing control or lost control of our product stream, if you want to be specific.

Q. (By Mr. Bender) Well, Doctor, did you see

anything like that and consider it in preparing the report?

A. No, I don't recall factoring that in.

MR. BENDER: Thank you.

MR. DuPONT: I'm sure Counsel has a memo if he wants to read it for you.

(Whereupon the deposition ended at 5:36 p.m.)

Commonwealth of Massachusetts
Middlesex, ss.

I, P. Jodi Ohnemus, Notary Public in and for the Commonwealth of Massachusetts, do hereby certify that there came before me on the 6th day of November, 2019, the deponent herein, who was duly sworn by me; that the ensuing examination upon oath of the said deponent was reported stenographically by me and transcribed into typewriting under my direction and control; and that the within transcript is a true record of the questions asked and answers given at said deposition.

I FURTHER CERTIFY that I am neither attorney nor counsel for, nor related to or employed by any of the parties to the action in which this deposition is taken; and, further, that I am not a relative or employee of any attorney or financially interested in the outcome of the action.

IN WITNESS WHEREOF I have hereunto set my hand and affixed my seal of office this 10th day of November, 2019, at Waltham.

<%6433,Signature%>

P. Jodi Ohnemus, RPR, RMR, CRR
CSR, Notary Public,
Commonwealth
of Massachusetts
My Commission Expires:
3/14/2021

Andrew DuPont, Esquire
adupont@lockslaw.com
November 12, 2019
RE: Rhyne, Bruce v. U.S. Steel
11/6/2019, Robert F. Herrick , Sc.D., CIH, FAIHA (#3611003)

The above-referenced transcript is available for review.

Within the applicable timeframe, the witness should read the testimony to verify its accuracy. If there are any changes, the witness should note those with the reason, on the attached Errata Sheet.

The witness should sign the Acknowledgment of Deponent and Errata and return to the deposing attorney. Copies should be sent to all counsel, and to Veritext at cs-midatlantic@veritext.com

Return completed errata within 30 days from receipt of testimony.

If the witness fails to do so within the time allotted, the transcript may be used as if signed.

Yours,
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Rhyne, Bruce v. U.S. Steel
Robert F. Herrick , Sc.D., CIH, FAIHA (#3611003)
ACKNOWLEDGEMENT OF DEPONENT

I, Robert F. Herrick , Sc.D., do hereby declare that I have read the foregoing transcript, I have made any corrections, additions, or changes I deemed necessary as noted above to be appended hereto, and that the same is a true, correct and complete transcript of the testimony given by me.

_____ _____
Robert F. Herrick , Sc.D., CIH, FAIHA Date
*If notary is required

SUBSCRIBED AND SWORN TO BEFORE ME THIS
_____ DAY OF _____, 20___.

_____
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Rhyne, Bruce v. U.S. Steel
Robert F. Herrick , Sc.D., CIH, FAIHA (#3611003)
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